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MEN AND WOMEN

THEIR

STRUCTURE AND FUNCTION

AND HOW TO SUPPLY THEIR WANTS, DIRECT THEIR POWERS, AVOID THEIR AFFLICTIONS, AND SUSTAIN THEIR LIVES

BY

FRANKLIN D. CLUM, M. D.

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PREFACE.

We all desire health; we want our existence to be as pleasing and agreeable as it can be made. We all have our rivalries, uncertainties and hard struggles in the great battle of life; we all have our cares and afflictions which shorten our existence. There is universal anxiety in the exciting contest for money, position or distinction, and life has its grand successes and melancholy failures—its ups and downs. Success in business, in society, or in attaining a desired object in life, does not imply happiness or freedom from worry and disease. We may emerge from poverty and obscurity to wealth and position, but care, trouble and affliction will still intrude.

The object of this book is to show how to supply the real wants of the human body, how to properly direct its powers, how to avoid its afflictions, and how to sustain or prolong its life; and although the little volume has its imperfections, the author hopes that it will assist men and women in passing through life with as little trouble, as little anxiety, as little weariness, and as little physical suffering as possible.

A general knowledge of medical science is of paramount importance to all; for if we are enabled to prevent a disease we are saved the necessity of curing

it; but if, through lack of knowledge, the disease is not prevented, it must be cured, or it will terminate in death, which is a departure from the present scene.

People generally are getting interested in the well-being of their bodies; superstitions are vanishing, and they have learned that the various loathsome diseases are the result of the neglect of sanitary laws, and that the remedy lies within their reach. As the hindrances of health are being taken away, there will be great physical improvement. We are advancing toward physical perfection, and the future man will be a healthier and a better one.

Children naturally improve upon their parents; if they do not it is because the laws of health have been violated. Careless habits, intemperance, dissipation, over-work, error in diet, breathing impure air, etc., etc., weaken or injure the body; and nine tenths of the maladies that afflict us are preventable, as will be shown in the following pages.

Good health is the basis of all physical, mental and spiritual improvement, and we should recognize its value and carefully guard and protect it. Those who plunder our property take from us that which can be repaid in time, but what period can repay for a fatal disease or injury? Those who ridicule our poverty, or reproach our business or profession, upbraid us with that which industry may retrieve and integrity purify; but what riches can restore the dead to life? Can any injury be more fatal? For the remedy or antidote has been neglected or lost.

Is it not better to prevent a disease, than to take

the chances of curing it? If so, physical education should be the first thing attended to. We should learn how to supply our wants, direct our powers, and avoid our afflictions; we should learn what are the causes of disease and how to avoid them. It matters not how familiar we are with medical science, we should remember that there is always something to learn, and that when respiration ceases, our education is finished, and not a moment sooner.

The matter contained in this volume is based on the latest and highest authorities, and is written in a style that can be understood by all who know how to read. The language used is as clear, direct, concise and explicit as is compatible with the subject under consideration.

F. D. CLUM, M. D.

Amsterdam, N. Y.

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PART I.

THE HUMAN BODY:

ITS STRUCTURE AND FUNCTIONS.

MEN AND WOMEN.

THEIR STRUCTURE AND FUNCTION.

INTRODUCTION.

THOSE unacquainted with the science of medicine and surgery, find little or nothing to interest them in the structure of a human being. They consider anatomical reading dry, and recoil with horror from the act of dissecting, or separating and taking to pieces the different parts of the human body, to discover their situation, structure and economy; still a knowledge of the structure and functions of the bones, ligaments, muscles, nerves, arteries, veins, glands and organs of the human body, is of paramount importance in the preservation of health and curing disease, because no object can be understood by itself alone; it is a well-known fact that we understand anything the better the more we know of other things distinct from, yet related to it.

With a knowledge of the structure and function of the human body we are better prepared to supply

its wants, direct its powers, avoid its afflictions, and sustain its life, than we would be without it. A mechanic to properly repair a piece of mechanism, must have a knowledge of its intricate and delicate machinery; so with those who would cure or repair any disease or injury to the human body; they must have a knowledge of the component and constituent parts of the body.

The ancient philosophers carefully considered the organization and functions of the human body, and admitted the utility of anatomical knowledge; but the prejudices of every religious creed, from the most remote period, interdicted the dissection of human subjects; and the anatomist's knowledge, being obtained almost exclusively from the lower animals, was vague and superficial; they were, therefore, incapable of tracing the progress of disease, and the serious and fatal disorders were ascribed to the powers of sorcery. Various superstitious practices were resorted to in order to dispel the supposed charm and appease the wrath of the offended gods, and thus endeavor to cure the sick.

The first writings on the subject of anatomy are supposed to have been by Hippocrates (who was a native of Cos, an island of the Ægean, and who is often designated as the "Father of Medicine"), over four hundred years before the Christian Era; and the first recorded anatomical dissection was made by his friend Democritus, of Abdera.

Ptolemy I., a Macedonian, founder of the Greco-Egyptian dynasty of the Lagides, applied himself to the promotion of commerce, literature, science and the arts, in his dominions after the fall of Antigonus; philosophers, poets and painters assembled at his court, and the foundations were laid in his palace at Alexandria, Egypt, for an institution with a museum and library, which afterwards contained seven hundred thousand volumes for educational purposes.

Anatomy was publicly taught there among other sciences. Herophilus and Erasistratus were the distinguished anatomists at that time, and they greatly improved the science by more accurate and extended observations. It is said that Herophilus obtained permission from those in authority to dissect living criminals, which greatly extended his anatomical knowledge, but at the cost of terrible cruelty and punishment to the criminals.

Ptolemy II., who became ruler in 285 B. C., spared no pains in extending scientific knowledge to the highest point; and the Alexandrian Library and Museum under his reign became enriched with valuable acquisitions. The old-time prejudice which had caused anatomy to be ranked among the greatest of crimes, was uprooted, and physicians were encouraged and permitted to open the bodies of the dead, and given ample facilities in the pursuit of science; but this state of

scientific prosperity did not continue, for during the next three centuries, although there were numerous followers of Herophilus and Erasistratus, they are said to have been arrogant and self-conceited, and not one of them has been celebrated for any anatomical acquirements.

The Alexandrian Library fell more and more into a ruinous state, still it was kept up until the time of Galen, a celebrated physician of the second century, whose name is well known to the medical world. He was born at Pergamus, Asia, A. D. 131, and lived seventy years, during which time he accomplished more toward the advancement of anatomical knowledge than all before him. He travelled through Egypt and other Eastern countries for the purpose of obtaining a medical and anatomical education; and then after practicing four years in his native country he went to Rome where physicians at that time were greatly encouraged; but when the Roman Empire was overwhelmed by barbarous nations, science was almost extinguished in Europe. The only remains of it were among the Arabians in Spain and Asia.

Practical anatomy and the healing art then made but little or no progress for many centuries, during which time all classes of people considered the bodies of the dead as sacred and inviolable subjects; and had such an intense superstitious

fear of molesting them, that they regarded any person who would attempt dissection as great, if not a greater criminal than a murderer; therefore those interested in the study of anatomy and medicine were obliged to confine their investigations almost exclusively to animals.

In A. D. 1315, an Italian physician made the first dissection of the human body at Bologna, that had been made in several hundred years. He prepared a treatise on anatomy, in which the different parts of the body were described from nature, and the work, although very imperfect, was considered authority for more than two centuries.

In the sixteenth century the Emperor Charles V., ordered a consultation to be held by divines of Salamanca, to determine whether it was lawful or not to dissect a dead body. They considered it horrifying and sacrilegious, but finally, for the sake of science, physicians were permitted to dissect and examine quietly and privately, the bodies of those persons who had no friends or relatives to claim them after death. Vesalius, the most celebrated anatomist of his time, was appointed the Emperor's chief physician in 1544, and has been called the father of modern anatomy; in his disputations with other anatomists, they made their appeals to the human body, and thus in a few years the art was greatly improved. He gave the names to the

muscles, most of which are retained to this day.

Falloppius, an Italian physician, made many important discoveries in 1561, and published a work on anatomy. Eustachius, another Italian, published a work at Venice in 1563, and from this time forward anatomical knowledge gradually diffused itself throughout Europe.

Harvey, an English physician, discovered the circulation of the blood in 1619, which was one of the most important discoveries ever made in medicine, and the source of most of the subsequent improvement. There has since been abundant facilities for the study of anatomy, and medical science has improved and developed until at the present day it has reached a more perfect standard than at any time in the known history of the world.

I. — THE BONES OF THE SKELETON.

The bones of the skeleton are connected together by strong fibres, or ligaments, and form the frame-work or support for the soft parts of the body, and give it its general form and solidity.

Bones are found only in vertebrate animals, and furnish cavities for the lodgment and protection of vital organs, joints for locomotion, and levers for the attachment of muscles. Bone is a complex structure composed of about one third animal matter and about two thirds mineral substance, intimately combined, which makes them hard, strong, and slightly elastic; the more animal matter they contain the greater the elasticity. The bones of infants contain the most animal matter, which diminishes with age, and, as a consequence, the bones of childhood are elastic, and those of old age brittle.

In the entire skeleton there are two hundred distinct bones, which enumeration does not include the teeth, the three minute bones of each ear, and the little bones called sesamoid. The latter develop in adult life in those tendons which exert considerable pressure upon the parts over

which they glide; they are frequently found in persons whose habits are active and muscular, and their number varies.

During life, bone is permeated by small thread-like arteries, veins and nerves which run in canals called Haversian (after their discoverer), which form a network in the interior. These canals not only communicate with each other, but with the internal cavity and external surface, and from them radiate minute tubes called canaliculi, which abstract the mineral matter used in forming bone from the blood.

The central cavity of bones, in which the marrow lies, is called the medullary canal. In the bones of birds this canal does not contain marrow; it contains air which communicates with the bird's lungs; the bird is thus made lighter, and better adapted to flying.

The marrow in the bones of children is free from fat, and is a transparent, reddish fluid of tenacious consistency, but thickens as they advance in life, and forms vesicles of fat with blood-vessels distributed through them.

Bone is closely covered with a membrane called on that account periosteum, the use of which is to nourish by vessels which pass through it, the external layers of bone. Should a portion of the periosteum become destroyed, the outer layers of the bone will die; but, under favorable circum-

stances, will be repaired from within. The internal layers being supplied by minute internal arteries, will inflame, swell, become spongy and porous, and form granulations which will push off the dead plate and form themselves into new bone which supplies the place of the old.

An injury to a healthy bone produces no pain. In amputation the pain is confined to the nerves, and in cutting the bone little or no feeling is excited; but in a diseased condition the hidden sensibility of the bones becomes aroused. Injuries may produce inflammation of the bones, which in course of time will give rise to the most excruciating pain.

Anatomists divide bones into four classes; viz. long, short, flat and irregular. The long bones form a system of levers as in the limbs. The short bones are found where strength and compactness are required with slight and limited motion; as the eight bones of each wrist, and the seven of each ankle. The flat bones give protection to vital parts, and provide a broad surface for the attachment of muscles; they are the bones protecting the brain, the breast bone, the shoulder blade, etc. The irregular or mixed bones form the spinal column, the jaws, etc.

The various bones forming the skeleton are in two complete sets, united in the centre or median line — those on the right being exactly like those

on the left — some of these, like those of the spinal column and breast bone, although single bones, are capable of being divided into two exactly corresponding halves.

The Human Skull. The human skull is composed of two parts — the cranium and face. The cranium is composed of eight bones, which form a vaulted cavity for inclosing and protecting the brain with its membranes, vessels, and nerves. These bones are separate in infants, but as age advances they gradually unite by what anatomists call sutures, which are indented dovetailed seams.

The bones of the face, fourteen in number, form the basis of physiognomy, enter into the composition of the mouth, the orbits, or eye sockets, form an arch to the nose, and a support to the palate.

The largest Bones of the Face. The largest and strongest bone of the face is the inferior maxillary, which forms the entire lower jaw, the chin, and furnishes sockets for the lower teeth; but the most important bones of the face, on account of their liability to disease, are the superior maxillary or upper jaw bones; they are two in number, united in the median line of the face. They are next in size to the lower jaw bone, and enter into the formation of three cavities; the roof of the mouth, the floor and outer wall of the nose, and the floor of the orbit.

In the body of each superior maxillary bone is a very important cavity called the antrum, or maxillary sinus; it communicates with the nostrils by a small opening. Pus or matter occasionally collects in this cavity in connection with diseased teeth, causing pain, inflammation, swelling, and distortion of the face. The most porous part of the jaw bones is the alveolar process, which forms the sockets for the teeth, and develops with them; when the teeth are extracted, the bony structure becomes absorbed.

The most prominent bones of the face, which form the upper and outer part of the cheeks, are called malar bones. They are a distinguishing feature in the human countenance, as may be seen by comparing the high cheek bones of persons of certain nationalities with the regularly formed countenances of others.

The Orbits or Eye-sockets. The orbits or eye-sockets are each formed of seven bones; but three of these enter into the formation of both orbits, so that the two cavities are formed of only eleven bones. These three are the frontal, which forms the forehead, the ethmoid at the root of the nose, and the sphenoid at the base of the skull — named sphenoid from its wedge-like relations with the other bones of the cranium, with all of which it articulates. At the front part of the inner wall of the orbits, are

the smallest and most fragile bones of the face; they resemble a finger nail in form, thinness, and size, and contain a perpendicular canal for lodging a part of the lachrymal sac and nasal duct by which the tears are conveyed into the nostrils. (See "The Sense of Sight.")

The Temporal Bone and Ear Cavity. The temporal bone at the side and base of the skull, is the seat of the organ of hearing. Each temporal bone is composed of the squamous, mastoid and petrous portions.

The bone is called temporal because time and age is denoted by the hair of an individual first becoming gray in its immediate vicinity. The squamous portion is the anterior or front, and the upper part of the bone which forms part of the side of the skull, and is so named because its form is thin and scale-like. The mastoid portion is the inferior and posterior, or lower and back, part of the bone; it is called mastoid from its nipple-like prominence which can be felt behind the ear.

The middle ear or tympanum, and the internal ear or labyrinth, are situated in the petrous portion of the temporal bone, which is called petrous from its extreme density and hardness. It is wedged in at the base of the skull, and points inward, forward, and a trifle downward.

The internal ear, called labyrinth from the

remarkable complexity of its shape, consists, first, of a small rounded chamber called the vestibule, because it serves as an entrance to the remainder. The vestibule communicates with three narrow curved passages called semicircular canals. One of these canals is directed nearly upward and forward, another upward and sideways, while the third is horizontal. The vestibule and canals in a living healthy subject are both filled with a clear, transparent, fluid-like lymph, in which is suspended a membranous sheath or bag which in form is an exact repetition of the bony cavities. The sheath or bag is also filled with lymph, and it floats in the fluid of the labyrinth without touching the walls of the cavity. The auditory, the special nerve of the sense of hearing, is distributed to this membranous bag, its fibres spreading out in its substance. The remaining part, the front, of the internal ear is called the cochlea, from its resemblance to a snail shell. It is in front of the vestibule, with its apex directed forward and outward. It communicates with the vestibule, and like it and the semicircular canals, is filled with lymph; some of the fibres of the special nerve of hearing pass upward along its hollow axis and spread out in a membranous partition between the two parts of the double canal.

The vestibule, semicircular canals and cochlea, together comprise what is called the internal ear

or labyrinth. Sound is conveyed from the external ear to the internal ear or labyrinth by means of a complicated apparatus called the tympanum or middle ear. The vestibule has in the outer part of its bony wall an oval-shaped opening called on that account the oval window, or fenestra ovalis, as anatomists express it. It is covered by a thin membrane which prevents the fluid in the internal ear from escaping. A little less than a quarter of an inch outward from the membrane, the cavity leading to the internal ear is again completely closed by another membrane stretched tightly across its diameter. This is the membrane of the tympanum, and the cavity between the two membranes is called the drum of the ear, middle ear, or tympanum.

The sonorous vibrations of the atmospheric air are received by the auricle, the expanded portion of the external ear, and are conducted through the auditory canal to the membrane of the tympanum, from which the sound is transmitted to the membrane of the fenestra ovalis by a peculiar chain of three small bones, called the mallet, anvil, and stirrup, from the objects which they resemble. These bones are united by ligaments admitting of slight movement.

The cavity of the tympanum, like an ordinary drum, is filled with air, and communicates with the exterior by a side opening; for the mem-

brane of a drum to vibrate freely must have on both sides an equal pressure of air. The opening through which the tympanum is supplied with air, is called after the name of its discoverer, the Eustachian tube. Its length is about one and one half inches, and it is directed downward and inward to the pharynx or throat. A drum to be of use must also have an arrangement by means of which its membranes may be tightened or relaxed as occasion may require. Such an arrangement exists in connection with the drum of the ear; there are three small muscles attached to the little bones, called mallet and stirrup, and by their alternate contraction and relaxation they draw the bones backward and forward, and thus the tension of the membrane of the tympanum is increased or diminished.

The external ear consists of an expanded, trumpet-shaped, cartilaginous structure called the auricle; it collects the sound and conveys it through the auditory canal, which is a trifle over an inch in length to the drum of the ear. This canal has fine hairs and a resinous-like secretion termed ear wax, which protects it from the intrusion of insects. (See "The Sense of Hearing.")

Nasal Fossæ or Nose Cavity. Fourteen bones—all the bones of the face except the two malar and lower jaw, and three bones of the cranium,

the frontal, ethmoid and sphenoid — enter into the composition of the irregular cavities of the nose, which extend from the base of the cranium to the roof of the mouth, and are separated by a thin verticle septum.

The cavities communicate with the face by two apertures called anterior nares, or nostrils, and with the pharynx or throat behind by two posterior nares. Each nasal fossæ communicates with four sinuses and four cavities. The sinuses are hollow spaces containing air, and are the frontal above, the sphenoidal behind, and the maxillary and ethmoidal on either side, all of them in bones of the same name.

The four cavities with which the nostrils communicate, are the orbital by means of the lachrymal sac or tear duct; with the mouth by the anterior palatine canal; with the cranium by the olfactory foramen, and with the spheno-maxillary fossa, by the spheno-palatine foramen.

The Oral Cavity or Mouth. The bones entering into the formation of the cavity of the mouth are the maxillary, or jaw-bones, and the palate bones.

The uses of the cavity are for expression in sound, the reception of food, mastication, insalivation and gustation, and it has organs and agencies by means of which it accomplishes these ends.

The tongue, an important organ in this cavity, is attached by its root to a bone called hyoid or lingual bone, which is shaped like a horse-shoe, and is situated between the chin and breast bone. The hyoid is attached to no other bone, but is held in place by a series of muscles.

The Spine or Vertebral Column. The long chain of bones which extends from the skull down the entire length of the body, is called the spine, backbone or vertebral column. It consists of twenty-four distinct bones, forms the basis of support for the head and trunk, connects the other parts of the frame, and protects the spinal cord.

The vertebræ, or bones of the spine, are divided into the cervical, dorsal and lumbar — the regions of the neck, back, and loins; the number of bones forming these divisions being seven for the neck, twelve for the back, and five for the loins.

In addition to these the spinal column is prolonged below the lumbar vertebræ by a false vertebræ consisting of nine bones, but in the adult united into two bones called the sacrum and coccyx.

The cervical vertebræ, or those that form the neck, are the smallest, and they increase in size from the skull down. The first cervical vertebræ is called atlas, because it supports the globe of

the head; the second is called the axis, from its forming a pivot upon which the head rotates.

Each of the bones of the spine consists of two parts; one known as the body, and the other as the arch. The former is solid, convex before and concave behind. The latter is formed by two pedicles and two laminæ supporting seven processes; viz. four articular, two transverse, and one spinous.

The bodies of the vertebræ are piled one upon another, forming a strong pillar for the support of the cranium and trunk; the arches, forming behind a hollow cylinder for the protection of the spinal cord. Between each of the vertebræ apertures exist through which the spinal nerves pass from the cord.

The bones of the spine are connected together by strong ligaments, and separated by an elastic substance called intervertebral cartilage, which yields in whichever direction we bend, and afterward returns quickly to its original shape; the spinal column is thus protected from injury in the violent and sudden motions of the body. The intervertebral cartilage is constantly yielding to pressure during the day, so that when we retire to our beds at night our height is one inch less than when we arose in the morning; we are also a little shorter in old age than in youth.

The Thorax or Chest. The thorax, or cavity of

the chest, is that space formed by the ribs — twelve on each side — the twelve dorsal vertebræ behind, and the breast bone and costal cartilages (prolongations of the ribs) in front; it serves to lodge and protect the heart, lungs, and largest bloodvessels of the body.

The Pelvis. The pelvis, a bony expansion resembling a basin, is a strong, massively constructed cavity of large, firm bones, connecting the trunk and lower extremities.

The cavity is formed by four bones; viz. an os-innominatum, or hip-bone, on each side, and the sacrum, the base of the spine, and coccyx, its prolongation, behind. By placing the hands upon the hips, the flaring edges of the os-innominatum are plainly felt. The intestines and other organs are supported in the basin-like cavity of the pelvis.

The Lower Extremities. The two inferior or lower extremities are for the purpose of supporting and carrying the rest of the body. They are each composed of the following bones; viz. a femur or thigh bone, which is the longest, largest, and strongest bone of the skeleton, and upon which the pelvis rests; a patella or knee pan, a flat, triangular bone; a tibia and fibula, the bones of the leg; seven bones of the tarsus, or ankle; five bones of the metatarsus, or foot; and fourteen bones of the phalanges or toes.

The Shoulder and Upper Extremities. Two bones, called the clavicle or collar bone, and the scapula or shoulder blade, form the shoulder. The bone called the humerus, which extends from the shoulder to the elbow, forms the arm; and the radius and ulna, extending from the elbow to the wrist, the forearm. The carpus, or wrist, is composed of eight bones, the metacarpus or hand, five, and the phalanges or fingers, fourteen; three for each finger and two for the thumb.

The Joints or Articulations. The connection between the bones of the skeleton are designated by the name of joint or articulation. The machinery of the joints, in addition to bone, the fundamental element, consists of ligaments, cartilages, and synovial membranes.

Ligaments are strong, tough bands or cords, composed mainly of white fibrous tissue. They serve to connect the bones together, and are found in nearly all movable joints.

Cartilage is a firm elastic substance something like rubber, and is either temporary or permanent. The temporary is found chiefly in the fœtus, where it forms the greater part of the skeleton, and is afterward replaced by bone. The permanent is found between the joints of individuals of all ages where its elasticity enables it to break the force of concussions. Permanent cartilage is also found in various parts of the body;

it serves to prolong the ribs forward to the front of the chest, and forms the external ear, air passages, etc.

The synovial membrane is a short wide tube attached by its open ends to the margins of the articulating extremities of the bones, and covers the ligaments which connect the articulating surfaces. It secretes a peculiar fluid which is thick, viscid and glairy, like the white of an egg, and is called on that account synovia. Its use is to lubricate the joints and the sheaths in which the tendons play, and it is as necessary as oil to the joints of machinery.

In addition to the synovial membrane, some of the joints are assisted in the performance of their functions by the bursæ, which are membranous cavities, between surfaces which move upon each other, and also contain a fluid for lubricating purposes.

The articulations or joints are of three kinds; viz. immovable, mixed and movable. The immovable joints are either in the form of a seam with processes and indentations interlocked together, or in the form of a fissure where a thin plate of one bone is received in a cleft or fissure of another, or in the form of a nail where a conical process is fastened into a socket, as the teeth are with the alveoli of the jaws. The mixed joints are those which allow of but limited

motion, as between the bodies of the vertebræ, or spine bones.

The movable articulations include the majority of the joints of the body, and are of four varieties, which are determined by the kind of motion permitted in each; the movements permitted are the gliding, angular, circumduction, and rotation.

II. — THE MUSCLES. — THE SKIN.

The muscles, a fibrous contractile tissue, are the fleshy part of the body. They control its movements by being connected with the bones, cartilage, ligaments and skin, and are divided into two kinds which are distinguished by structural peculiarities and mode of action. One kind is red, striated, or striped, and is called voluntary, or muscles of animal life; the other kind is pale, or white, and non-striated, and is called involuntary, or muscles of organic life.

The striped muscles or those of voluntary or animal life are made up of bundles of minute reddish fibres running side by side in the same direction inclosed in delicate tissue. These bundles are placed side by side with other similar bundles, and a number of them are united into larger bundles, and these again into still larger until the entire muscle is made up of many bundles of parallel fibres marked by transverse lines or stripes which run around them in a circular direction. The bundles of muscular fibres can be separated from each other by careful dissection and reduced to finer and finer divisions

until they become too small to be seen without the aid of a microscope.

The striped muscles make up the great bulk of muscular tissues, and as a rule are capable of being put in action and controlled by the will; but occasionally they are subject to emotional and instructive influences in which the will has no control. The heart is a muscular organ made up of striped muscular tissue, but is beyond the influence of the will; the facial muscles of expression are controlled more by emotion than by will; and the will has but partial control over the muscles of respiration, the muscles of the ear and the sphincters — sphincter muscles are ring-like and constrict or close natural openings.

The unstriped, involuntary muscles are composed of pale flattened bands or bundles of spindle shaped fibres, and are found in the walls of the hollow viscera; viz. the trachea, bronchi, stomach, intestines, gall-bladder etc. They are not under the influence of the will, and their contraction is not rapid and does not involve the whole muscle as is the case with the striped muscles.

The membranes, which are composed of the unstriped, involuntary muscle, slowly contract a part of their extent, usually under the influence of mechanical stimulus, and then the contracted part slowly relaxes while another part of the membrane contracts. What is called the "vermi-

cular motion" of the intestines is produced by this peculiar action of the unstriped muscles which enter into the formation of their walls.

Muscles are so arranged that they give beauty to the body as well as strength. Nerves, arteries and veins are distributed to them, and they are either in a state of active contraction or passive relaxation. During contraction they do not become either larger or smaller, but increase in thickness in exactly the same proportion that they diminish in length.

Most of the muscles of the body and limbs are arranged in pairs and act alternately with each other, as flexors and extensors, abductors and adductors, supinators and pronators, etc. Muscles that bend a joint are called flexors, and those that straighten it extensors. One is on the anterior or front part of the joint, and the other on the posterior or back part. By the alternate contraction and relaxation of the two sets of muscles the movements of the body are accomplished; but should both sets of muscles of a limb act at the same instant, the limb would become stiff and rigid, and could not move in either direction.

Muscular power is expended during contraction and regained during relaxation, therefore a muscle cannot remain contracted during any great length of time, but must relax that its force may be restored. It is intended in the movements of the

body that the muscles should be constantly changing from one state to the other, and thus keep their natural vigor unimpaired. When there is no movement, as when the arm or leg are outstretched and kept in one position without changing, it is found exceedingly exhausting in a short time; while the natural motion of the limb a much longer time would not be exhausting. Standing upright and motionless for the same reason, is more tiresome than walking. Muscular fibres are constantly inclined to contract as is evident from the fact that when the muscles of one lateral half of the face are paralyzed the antagonistic muscles always draw the features to the other side. The contraction is not exhausting in instance of this kind because there is no power in the paralyzed muscles to overcome and the contraction required to draw the soft tissues aside is but slight.

Man, without the aid of the muscles, could not stand erect and would be a helpless, shapeless mass. When the muscles cease to act, as in apoplexy, or in injury to the brain, or nerves distributed to the muscles, the head drops upon the chest, the spinal column bends forward, the arms hang helpless, the lower limbs bend and give way at the hip and knee joints, and there is general relaxation, prostration, and entire collapse.

Muscles vary in their form, shape and size; the stapedius, a small muscle of the internal ear, weighs only about a grain, while the gastrocnemius muscle forms the chief bulk of the calf of the leg; the longest muscle of the body, called sartorius, is nearly two feet in length.

The total number of muscles in the adult is reckoned at five hundred and twenty-seven, of which two hundred and sixty-one are in pairs, and five single on the median line. The muscles of the head and face number eighty-three, of the neck forty-nine, of the thorax seventy-eight, of the abdomen thirty-three, of the back seventy-eight, of the upper extremities ninety-eight, and of the lower extremities one hundred and eight.

The origin of a muscle is its fixed point, and its insertion is its movable one, and as its object in contracting is to draw the parts to which it is attached nearer to each other, both ends of a muscle are not attached to one and the same bone.

All muscles are enveloped in a sheath and terminate at one or both ends by rounded cords of white glistening fibrous tissue, called tendons or sinews. The tendons are strong and unyielding, and have no contractile power like the muscles. There are also shiny, pearly-white, fibrous membranes called aponeuroses, which are connected with muscles and with bones, cartilages and ligaments.

Muscles have been named according to their uses, their position, their shape, their dimensions, their direction, their composition and their attachments. The muscle called diaphragm, which acts as a partition in separating the cavity of the chest from that of the abdomen, and the muscles called extensors, flexors, levators, depressors, etc., are named according to their uses. The temporal muscle, interspinals, etc., are named according to their position. The muscles known as trapezius, splenius, serratus, digastric, deltoid, scalenus, etc., are named according to their shape. The muscles pectoralis major and minor, and the maximus, medius and minimus, are named according to their dimensions. The obliquus, transversalis and rectus abdominus muscles are named according to their direction. The muscles called semimembranosus, semitendinosus, complexus, etc., are named according to their composition; and the sternoclidomastoideus, and sternohyoideus muscles are named according to their attachments.

The covering of the human body, the skin, is not only for the protection of the deeper tissues, but as it is supplied with numerous nerve filaments, it is endowed with exquisite sensitiveness, and is the principle seat of the sense of touch; and as it has numerous pores or openings which give passage to the sweat and other exhalations, it is the great regulator of the heat of the body.

The skin extends into all the natural openings, and within the body it is called the mucous membrane, because it changes its properties and becomes soft and moist. The skin on the surface of the body is of variable thickness, and is usually described as composed of three layers; viz., he epidermis or cuticle, the rete mucosum, and the derma or cutis vera; the latter being most internal, and the sensitive papillæ are on its surface, and the sweat glands, hair follicles and sebaceous glands are imbedded beneath it. The rete mucosum is between the cuticle and cutis vera, and is but slightly developed in white races, but is very thick and distinct in the negro, and its cells are filled with pigment which gives the dark color to their skin. The epidermas or cuticle is the external part of the skin, and is formed of a disorganized scaly substance which is intended as a protection, or defensive covering to the sensitive true skin beneath. This is the layer of skin raised when a part is said to be blistered.

The skin is very elastic, and occasionally in dropsical and other swellings stretches to enormous proportions.

The hair, nails, sudoriferous and sebaceous glands and their ducts are the appendages of the skin.

III. — THE NERVOUS SYSTEM. — ITS STRUCTURE.

That portion of man by which the mind is brought into connection with the physical world is called the nervous system; its tissue is composed chiefly of two different structures, called the gray or vesicular, and the white, tubular, or fibrous; they not only differ from each other in color, density, and minute structure, but in chemical composition.

Nervous impressions and impulses are supposed to originate in the former, which is of a dark, reddish-gray color, and is never found in the nerves, but is usually collected in masses, called nerve-centres, where it is intermingled with the white tubular or fibrous structure. It may be seen in the brain, spinal cord and ganglia; the latter are knot-like enlargements in the course of a nerve. Impressions and impulses are conducted by the white, tubular substance, which besides entering into the composition of the brain and spinal cord, forms almost the whole of the cerebro-spinal nerves and a great part of the sympathetic.

The tubular nerve fibres are slender white

threads or filaments, and are distributed in every direction throughout the various tissues of the body, reaching every part of the skin, muscles, and glandular organs. They are of extreme delicacy, and too small to be seen without the aid of the microscope; but as they approach each other they unite, side by side, into little bundles; as these bundles emerge from different parts, they join each other, and these again join others; when such a collection becomes large enough to be seen by the naked eye, it is called a nerve, which is a round or flattened cord distributed at one end with the various textures of the body, as just mentioned, and at the other connected with the brain, spinal cord, or ganglia.

Nerves in their course from a nerve centre not only subdivide into branches, but these frequently communicate with the branches of a neighboring nerve; and although the fibres which compose a nerve become intermixed with those of other nerves, in no instance have the separate fibres been shown to coalesce; each nerve fibre, like the separate threads in a skein of silk, proceeds uninterruptedly from its origin to its destination.

The nervous substance besides being composed of two different structures, is again divided into two portions or different systems. The first is called the cerebro-spinal system, and it includes the brain, spinal cord, and nerves proceeding from

them. This system presides over the locomotory, respiratory, sensitive and intellectual functions. The second, called the sympathetic system, consists of a chain of ganglia extending from the cranium to the pelvis along each side of the spinal column; nerves with ganglia branch from this system to the viscera in the thoracic, abdominal and pelvic cavities.

The sympathetic system presides over those organs over which the consciousness and will have no immediate control: by means of its numerous communications with the cranial and spinal nerves, it is indirectly, but not directly, connected with the brain and spinal cord.

Nerve fibres are bound together, covered and protected, by a strong thin transparent membrane called the neurilemma or sheath. The white tubular nerve fibre, and what is called the gelatinous fibre, are intermingled in most nerves, the former being more numerous in the cerebro-spinal system, and the latter predominating in the sympathetic system.

The nerve fibres of both the cerebro-spinal and spmpathetic systems are of two different kinds, endowed with two different functions, although between these two kinds there is no apparent difference in their structure. One kind called afferent or sensitive fibres, convey impressions from without inward; the other kind called efferent or

motor fibres, transmit nervous stimulus from within outward.

When two or more nerves communicate, it forms what is called a plexus, in which the component nerves divide, then join and again subdivide, in such a complex manner that the nerve fibres become most intricately interlaced.

The Brain. All that portion of the nervous system within the cavity of the cranium, is called the encephalon or brain; it is divided into four principal parts, called the cerebrum, cerebellum, pons varoli and medulla oblongata.

The average weight of the whole mass in the adult male is about fifty ounces, and in the female about five ounces less. It gradually increases in weight, in both sexes, up to forty years of age, after which it loses about one ounce with each ten years.

The brain is covered, held together and protected, by three membranes, called the dura mater, arachnoid, and pia mater. The dura mater or hard mother, is so called because it is a thick, inelastic membrane, and is firm and resisting. It lines the interior of the cranium and its outer surface which adheres closely to the inner surface of the cranial bones, is rough, but its inner surface is smooth. The arachnoid and pia mater are very delicate membranes. The arachnoid, which is between the dura mater and the pia mater, is

called arachnoid because it is like a spider's web in its extreme thinness. The pia mater, or kind mother, is so called because it dips into every fold and convolution of the brain, and protects and supports the organ in every direction. It is the innermost membrane and consists of minute plexus of bloodvessels held together by a remarkably fine areolar tissue.

The outer surface of the brain beneath the membrane, is broken into numerous folds called convolutions — there are a countless number of little eminences with depressions called sulci between them. The outer surface is composed of gray nervous matter, and is called the cortex or bark; the inner portion is called the medullary substance from its white marrowy appearance.

The cerebrum forms the largest portion of the encephalon, and occupies almost the whole of the upper and front part of the cranial cavity. It is divided by a median longitudinal fissure into two exactly corresponding halves, called right and left hemispheres, which are connected at their base by a white medullary band called the corpus-collosum. Each hemisphere is subdivided at its base into three lobes, named from their situation the anterior, middle, and posterior lobes.

The cerebellum, called little brain (its average weight in the male being but five and one half ounces), is situated beneath the posterior lobes of

the cerebrum, and like it is divided into two symmetrical halves which are united by a convex white body called the pons varolii.

The pons varolii is a bond of union connecting the cerebrum above, the cerebellum behind, and at its lower border the medulla oblongata (upper part of the spinal cord), which is about an inch and a quarter in length; it extends through a hole in the bottom of the skull, called foramen magnum, which is placed directly over and opens into the channel in the spine; at the upper border of the first spine-bone the spinal cord proper commences.

The Spinal Cord. The spinal cord extends from the brain down the spinal canal to the lower border of the body of the first lumbar vertebræ, where it terminates in a slender filament of gray nervous matter. It occupies in the adult the upper two thirds of the spinal canal; its length is about seventeen inches. It does not fill the spinal canal, and when divested of its membranes and nerves, its weight is only one ounce and a half.

The spinal cord is soft and delicate, and is composed, like the brain, of white and gray nervous matter; but the gray matter instead of forming the outer portion, as in the brain, occupies the centre. The white nervous matter constitutes the greater part of the cord.

The spinal cord is covered and protected by the same number of membranes that envelope the brain, and they bear the same names. In form the cord is a flattened cylinder. Two longitudinal median fissures, one in front and the other behind, divide it into two symmetrical halves, but they are united in the middle, throughout the entire length, by a transverse band of white and gray nervous substance called the commissure, or respectively the white and gray commissure.

The Spinal Nerves. The nerves which issue from the sides of the whole length of the spinal cord are thirty-one pairs, which number corresponds with the intervertebral foramina through which they pass. Eight are called cervical nerves, twelve dorsal, five lumbar, five sacral, and one coccygeal. Each nerve arises by an anterior or motor, and a posterior or sensory root; the latter is the largest, and directly after it emerges from the membranes which surround the cord, a ganglion is developed upon it. None of the fibres of the anterior or motor root intermingle with the ganglion, although the root lays in contact with it; immediately beyond the ganglion the two roots are united in one sheath, and their fibres, by intermingling, form a compound or mixed nerve, which after issuing from the intervertebral canal, divide into an anterior and posterior branch, each containing fibres from both roots. The nerves in

their distribution divide and subdivide into various branches, from which nerve filaments are sent to every part of the body and limbs.

The anterior branches of the first four cervical nerves form the cervical plexus, which is in front of the four upper vertebræ, and has both superficial and deep branches, the most important of which is the phrenic nerve; this nerve is formed by the third and fourth cervical, and a branch from the fifth. It descends to the root of the neck, enters the chest, and sends a few filaments to the membranes surrounding the lungs and heart, then passes down to the diaphragm (the muscular partition between the chest and abdomen), which it pierces, and is distributed to its under surface. The right phrenic nerve is a little shorter than the left, but both are distributed to the diaphragm, which depends upon them for the whole power of motion in respiration.

The twelve intercostal nerves on each side, which, as their name indicates, are distributed to the intercostal muscles between the ribs — the six lower being also distributed to the walls of the abdomen — are the anterior branches of the twelve dorsal nerves; they are united with the spinal cord from the level of the first rib to that of the last.

Most Important Nerves of the Body. The mechanism of respiration consists of the movement of

the diaphragm, by which the abdomen is protruded below, and the movement of the intercostal muscles, by which the chest is raised and expanded above. Now as the phrenic and intercostal nerves enable the diaphragm and intercostal muscles to move in the act of respiration, and as death would ensue should they cease to act, these nerves may be considered the most important in the human body.

When the spinal cord is injured at the lower part of the neck, or the level of the first rib, the intercostal muscles are paralyzed and the chest will not expand; therefore a fracture of the upper part of the spine is more dangerous than one lower down. Although the intercostal muscles do not act, death will not ensue, for breathing is partially kept up by the action of the diaphragm; but should the neck be broken above the middle part, and the spinal cord severed above the third vertebræ, death will occur immediately.

The Brachial Plexus. The Brachial plexus is formed by the interlacing of the anterior branches of the four lower cervical and first dorsal nerves, and extends from the lower part of the side of the neck to the axilla or arm-pit. It communicates with the cervical plexus, has branches both above and below the clavicle or collar bone, has a communicating branch to the phrenic nerve, has branches to the shoulder and chest, and sends numer-

ous branches to supply the arm, fore-arm and hand.

Lumbar and Sacral Nerves and Plexuses. The lumbar plexus is formed by the anterior branches of the four upper lumbar nerves, and is located in a muscle called psoas. Its branches may be divided into two groups, one of which supplies the wall of the abdomen, and the other supplies the forepart of the thigh and inner side of the leg. The roots of the lumbar nerves and upper sacral are the largest of all the spinal nerves, and the roots of the sacral and coccygeal nerves, on account of the spinal cord not extending beyond the first lumbar vertebræ, are the longest of all the spinal nerves.

The anterior branch of the fifth lumbar nerve, joined with a branch from the fourth, unites with the first sacral nerve and forms what is called the lumbo-sacral nerve. The sacral plexus is formed by this nerve and the anterior branches of the three upper sacral nerves and a part of the fourth; the plexus has five branches distributed to the neighboring tissue, the largest and most important of which is the great sciatic nerve.

Largest Nerve in the Body. The great sciatic is the largest nerve in the body (it measures three quarters of an inch in breadth), and descends along the back part of the thigh, dividing at its lower third into two large branches. In addition

to supplying the muscles of the back part of the thigh, it supplies those of the leg and foot and nearly all the integument of the leg. When this nerve is affected with neuralgic pain the disease is called sciatica.

The Cranial Nerves. The nerves which arise from the nerve centre within the cranium are called cranial nerves. They are nine in number on each side; they are numbered according to the order in which they pass out of the cranial cavity, and, like the nerves of the body and limbs, those of the right side correspond exactly with those on the left.

Three of the cranial nerves, although classed as sensory nerves, are neither sensitive nor motor in the ordinary meaning of these terms; and they are capable of conveying only the special sensation characteristic of the organ with which they are connected. They are the olfactory, the special nerve of the sense of smell, the optic, the special nerve of the sense of sight, and the auditory, the special nerve of the sense of hearing.

The olfactory, unlike the other nerves of the body, is soft and pulpy in structure; it contains gray matter in its interior, and instead of a nerve it may be regarded as a lobe, a ganglion, or a part of the brain. From that portion of it known as the olfactory bulb are given off about twenty nerve filaments, which are distributed to the

lining membrane of the nose for the purposes of conveying odorous impressions to the brain.

All of the muscles of the eyeball are supplied by the third nerve, and the muscle of the eyeball called superior oblique is also supplied by the fourth, the smallest of the cranial nerves.

The fifth, the largest of the cranial nerves, is called trifacial, because while within the cranium it divides into three portions, distributed respectively to the upper, middle and lower parts of the face. It is peculiar in having various functions, and it is composed of both sensory and motor nerve fibres, which form a nerve of sensation to the head and face, of motion to the muscles of mastication, and of the sense of taste to the anterior part of the tongue. As it supplies the jaws and teeth it is a nerve with which dentists should be familiar.

The sixth nerve supplies a muscle of the eyeball called external rectus. The seventh nerve is divided into the portio dura, hard portion, and portio mollis, soft portion; the former is the motor nerve of expression in the face, supplies the muscles of the external ear, etc., and is called the facial nerve; the latter is distributed to the internal ear and is the auditory nerve, or nerve of hearing.

The eighth consists of three nerves, called glosso-pharyngeal, pneumogastric, and spinal accessory.

The glosso-pharyngeal is a special nerve of taste, a nerve of motion to the pharyngeal muscles, and of sensation to the mucous membrane of the pharynx and tonsil. It derives its name from its distribution. The pneumogastric is so called because it is distributed to the organs contained in the chest and abdomen. It has a more extensive distribution than any other cranial nerve, and its fibres are both motor and sensitive. The nerve supplies the organ of voice and respiration with both of these fibres, and has motor fibres distributed to the pharynx, æsophagus, stomach and heart. The spinal accessory nerve has two portions, one the spinal, and the other accessory to the pneumogastric. The ninth, called hypoglossal nerve, is the motor nerve of the tongue.

IV. — THE NERVOUS SYSTEM. — ITS FUNCTIONS.

The nervous system presides over and governs the entire body, and whether we are asleep or awake all our acts and feelings are through its agency.

The brain, the great nervous centre, collects and preserves impressions for an indefinite length of time, as is seen in the remarkable power of memory, which is an important power, as our actions are guided by what has previously taken place; without the power of memory life would be a blank, a period of idiocy, and our acts capricious and unreasonable.

The intellectual faculties, reason, judgment, memory, etc., depend upon the quantity and quality of brain, but principally the latter. Brains may be of the same size and weight, but differ as to quality. The greater the number of folds or convolutions, and the greater the quantity of gray matter, the better the quality of the brain, and more superior the intellect. As the gray nervous matter is that part of man which enables him to think, reason, guide and direct the movements of his body, it is the residence of his immortal principal,

his rational, spiritual part, his soul. The eyes and face reveal the thoughts, emotions and even the most private feelings, and have therefore been called "the mirror of the soul." The expression is as true scientifically as metaphorically.

The brain and nervous system are subject to the same law of growth and decay of its atoms as govern the other parts of the body. Every thought, every mental effort, destroys a certain portion of cerebral matter, and when destruction takes place more rapidly than renewal, as in excessive study, or over-anxiety, a wasting or softening of the brain is the result. For the nourishment and restoration of the brain, the removal of old worn-out atoms and the deposit of new and sleep, the brain's natural rest, at certain intervals, is required. As the brain is the most active part of the body, it requires and receives a much larger proportion of blood than any other part.

The brain gains strength and develops by moderate appropriate exercise; and the mental faculties are developed to a greater or less degree in different persons and in the same person at different ages. The brain although the organ of sensation, is not itself sensitive; its substance can be cut with less pain than the fingers, but attended of course with the greatest danger. The excitement to all muscular motion flows from the gray matter of the brain, spinal cord, or a ganglia,

through the motor nerves to the part that is wanted moved.

Nerves conduct impressions only, and they have no more power of generating force or of originating impulses than telegraphic wires have of originating in themselves the messages which they transmit. The nervous system and the telegraphic system are somewhat similar; the nerves represent the wires and the nerve centres the offices, but the nerves transmit impressions only in one direction. The afferent or sensory nerve fibres have the power only of conveying impressions from different parts of the body to a nerve centre, and are each capable of only one kind of sensibility; as of touch, sight, hearing, taste and smell, and no more than one of these. The efferent or motory nerve fibres have the power only of conveying impressions from a nerve centre, calling into motion or activity the muscles or organs to which they are distributed. The rapidity with which this is accomplished is described in the *New York Medical Record*, in its issue of October 15th, 1881, page 423, as follows:

"The rapidity of nerve-impulses has been quite accurately measured, and has long been well known. Hirsch's experiments are also quite familiar, in which he showed that a touch on the face was recognized by the brain, and responded to by a manual signal in the seventh of a second; also

that the speed of sense differed for different organs; the sense of hearing being responded to in the sixth of a second, while that of sight required only one fifth second to be felt and signalled. In all these cases the distance traversed was about the same, so the inference is that images travel more slowly than sounds or touch. It has still remained, however, to show the portion of this interval taken up by the action of the brain. Professor Donders, by a very delicate apparatus, has demonstrated this to be about seventy-five thousandths of a second. Of the whole interval, forty thousandths are occupied in the simple act of recognition, and thirty-five thousandths for the act of willing a response. When two irritants were caused to operate on the same sense, one twenty-fifth of a second was required for the person to recognize which was the first; but a slightly longer interval was required to determine the priority in the case of the other senses. These results were obtained from a middle-aged man, but in youths the mental operations are somewhat quicker than in the adult. The average of many experiments proved that a simple thought occupies one fortieth of a second."

As a sensory nerve's only function is to transmit impressions from its extremities to a nerve centre, the brain refers all impressions made in any part of a nerve's course to its terminations; for

instance, when the trunk of a nerve is injured, as when the elbow is struck suddenly against a hard substance and a nerve pressed between it and the bone, a peculiar sharp, tingling sensation is felt in the fingers, hand and forearm, where the terminations of the nerve are distributed. The feeling is so odd that people usually exclaim, "Oh, I have hit my crazy bone!" but it is the nerve and not the bone that is injured. The pain of any disease of a nerve is felt at its extremities. An example is shown in the disease called tic douloureux, which is an affection of the trunk of a nerve leading from the brain to the face, but the pain is felt at the extremities of the nerve on the face.

After a leg is amputated, should the nerves of the remaining stump be irritated, the brain refers the pain to the toes, foot, leg, or to whatever part the nerves had been distributed. People not understanding this have supposed that there was some mysterious connection between the separated and buried limb and the living body.

What is called reflex nervous action is a movement executed without consciousness. It consists of conveying a sensory impression inward to the gray matter of the spinal cord or a ganglia, where it is converted into a motor impulse and reflected outward. Examples of it are seen when all voluntary motion is lost in the lower limbs by the spinal cord being severed in the upper part of the back,

and communication with the brain cut off. Although the lower extremities are paralyzed, tickling the soles of the feet will cause twitching of the muscles and often slight movement of the limb through reflex nervous action. This action often takes place in health, but we do not usually notice it, because our attention is not attracted by a conscious sensation; but it is important in protecting the body from sudden injuries and in regulating the action of some of the internal organs. (See Diseases of the Nervous System.)

The Five Senses. The five senses, sight, hearing smell, taste and touch, have each an organ or surface to receive the impression, a nerve to convey it, and a sensorial ganglion in the brain to perceive it.

The sense of sight, hearing and touch, have been called the intellectual senses, as they administer more especially to the intellect; and the sense of smell and taste have been termed the bodily or nutritive senses, as they are more connected with the nutrition of the body.

A slight impression may be made upon either of the organs of sense while the mind is strongly preoccupied, without our taking cognizance of it; therefore to render a sense acute, attention should be given it.

When the nerves of special sense are irritated, touched or diseased, they excite sensations peculiar to the organ to which they are distributed; for instance, when the optic nerve is injured, an im-

pression of light is conveyed to the brain, and not pain. Probably everybody has, at some period of their life, "seen stars," as it is expressed, after receiving a fall, or blow, in which this nerve has been injured; or should the blow be on the side of the head, and an impression made on the auditory nerve, a ringing in the ears is produced. The roaring noise heard when the end of the finger is introduced into the ear, is caused by the circulation of blood in the finger. In certain diseases, patients complain of a bad taste in the mouth, and wash and purify it without avail, because the disagreeable taste is caused by a disturbance or derangement of the nerve of the special sense of taste.

The Sense of Sight. The sense of sight has for its organ the eye, lodged for its safety in a cavity or socket called the orbit, which has been described in connection with the skull.

The eyeball is composed of two fluids called humors, a crystalline lens, and three tunics or coats; the latter retaining the organ in its globular shape. The outer coat is formed by the sclerotic and cornea. The sclerotic is a firm, strong membrane which covers the entire globe, excepting about a fifth part in front, which is covered by the smooth, transparent cornea. The middle coat is formed by the choroid, iris and ciliary processes, the latter being formed by the folding inward of

certain parts of the former. The choroid is a thin vascular membrane, and its internal surface is coated with a dark brownish secretion called the nigrum pigmentum, which absorbs such rays of light as are not needed for vision. The iris, a continuation of the choroid coat, is of various colors in different individuals, therefore its name iris, a rainbow. It is a delicate circle with an aperture, the pupil, for the transmission of light in the centre.

The amount of light received into the eye is regulated by the expansion and contraction of the iris. When we go from a bright light into the dark we see with difficulty, because the iris is expanded and the pupil is so small that but few rays can enter the eye; but soon the iris contracts, the pupil enlarges, more rays are admitted, and we see more clearly; but too much light enters the eye and dazzles it when suddenly entering a very bright place from a dark one; but soon the iris expands, the pupil diminishes, fewer rays enter, and we see without inconvenience. The third or inner coat of the eye is the retina, on which the images of objects are impressed. The retina is principally the expansion of the optic nerve, which conveys impressions of sight to the brain. The refracting media of the eye is the aqueous humor, a clear, transparent fluid separated by the iris into an anterior and posterior chamber, but communicating through the pupil; the crystalline lens enclosed

in its capsule which lies behind the posterior chamber; and the vitreous humor which fills the cavity of the retina behind the crystalline lens forming four fifths of the entire globe.

The eyes appear larger in some persons than in others, but in reality there is but little difference in their size; but they are not as deeply set in their sockets, and the lids open wider in some persons than in others.

Each eyeball has six small, slender muscles inserted in their outer coat, and attached at the other end to the bony socket. They carry the eye through all its motions. Where one of these muscles act more powerfully than its antagonist, it draws the eye one side, and the person is said to be cross-eyed.

The appendages of the eye are the eyebrows, eyelashes, eyelids, conjunctive and lachrymal apparatus. The eyebrows and eyelids moderate the action of the rays of light in their passage to the eye, and protect the organ from insects and minute bodies. The eyelids protect the eye from injury by their closure. The upper is the larger and more movable of the two lids. They both are lined by the conjunctiva, which is a thin mucous membrane also continued over the front of the eye, and as it is kept moist it allows the lids to glide freely and smoothly over the ball. There are about thirty small glands on the inner surface

of the eyelids, the ducts of which have minute openings on the free margin of the lids. The use of their secretion is to smear the edges of the eyelids and prevent their adhesion, and also prevent the tears running over the lids; their relation to each other being similar to oil and water.

The lachrymal gland, at the upper, outer of the orbit which secretes the tears, and its excretory ducts which convey the fluid to the surface of the eye, comprise the lachrymal apparatus.

The tears are spread over the surface of the eye five or six times a minute by the act of winking, and thus wash it and keep it clean and moist. The fluid is then collected at the inner corner of the eyelids, and carried away by the lachrymal canals into the lachrymal sac, and through the nasal duct into the cavity of the nose. The lachrymal gland is sensitive to mental emotions, and by the sympathetic action of the nervous system is frequently excited to increased activity, and the tears which are discharged in excessive quantity being too abundant to be influenced by the secretion of the glands of the eyelids, run over their edges and trickle down the cheeks and face.

The Sense of Hearing. The organ of the sense of hearing, the ear, has been described in connection with the temporal bone, and it is supposed that the reader is familiar with the machinery by which this function is performed.

Sound is produced by the vibration of the atmosphere, and hearing is the sense by which sounds are perceived. Air is set in motion by the voice, the ringing of a bell, or any other cause, and comes in waves or undulations, and is collected by the auricle, the external ear, and the vibrations are transmitted to the internal ear, where it comes in contact with the filaments of the auditory nerve, and conveyed to the brain.

The Sense of Smell. The organ of the sense of smell, the nose, consists of an external and internal part — the nose and nasal fossæ; the latter having been described in connection with the skull.

The nose is a pyramidal eminence covering the nasal fossæ, occupying the upper middle part of the face between the forehead and upper lip, the eyes and the cheeks. The nose is formed of bones, cartilage, fibro-cartilage, muscles, vessels and nerves.

The mucous membrane lining the nose, called the schneiderian or pituitary membrane, receives the impression of odors by means of the expansion of the olfactory nerves upon that portion of it in the upper and middle part of the nostrils. The lower part of the nasal passages have no sense of smell, but are provided with ordinary sensibility, and feel the contact of solid bodies, sharp and irritating vapors, and feel sensations of cold, heat, itching, tingling, etc.

That the sense of smell and common sensation are distinct is proven by the fact that when the sense of smell is lost ordinary sensation still remains.

The nose is not only the organ of smelling, but serves as a passage for the air in breathing, and has an influence on the voice. The short stiff hairs in the openings of the nose are intended to prevent the entrance of particles floating in the atmosphere. The nose forms one of the characteristic features of the human face, and has been regarded as a reliable index of character, and is the one feature above all others that confers either attractiveness or repulsiveness to the countenance; but people's views differ as regards beauty.

The sense of smell besides adding to our pleasurable sensations directs us in the choice of food, warning us to avoid putrid and dangerous substances, and also warns us to avoid breathing a foul and unhealthy atmosphere.

The Sense of Taste. The organ of the sense of taste, the tongue, is a soft, fleshy viscus, movable in every direction. Its movements are subservient to speech, and the prehension and swallowing of food. The upper surface of the tongue is covered with numerous projections or eminences called papillæ, and in each lateral half of the tongue are distributed three nerves, which give the organ the

power of motion and common sensation besides the sense of taste.

Taste may be cultivated to a high degree of delicacy, and its use is not only to give pleasure in eating and drinking, but to guide in the selection of food; and it also excites the flow of saliva and other secretions by which the food is prepared for the digestive process.

The Sense of Touch. The skin, already described, is the principle seat of the sense of touch, the simplest and most extensively diffused of all the senses.

The sense of touch in certain parts, as the tongue, fingers, lips, soles of the feet, etc., is more acute than in others. The sense gives us information of the softness or resistance of bodies, of their shape, smoothness or roughness, of their fluidity or solidity, and of cold, heat, etc.

V.—THE VASCULAR SYSTEM.

The arteries, capillaries, veins and lymphatics are the four classes of vessels which in addition to the central organ, the heart, comprise what is called the vascular system.

The Heart and Circulation of Blood. The heart, a hollow muscular organ of conical form, the blood's reservoir, is enclosed in a membranous sack called pericardium, and placed between the lungs obliquely, in the lower front part of the thorax, inclined most to the left side. Its average length in the adult is five inches, breadth three and one half inches at broadest part, and its thickness two and one half inches.

Males have larger hearts than females. In the former its weight varies from ten to twelve ounces, and in the latter from eight to ten ounces. The organ continues to increase in size and weight, especially in men, up to an advanced period of life. The interior of the heart is divided into four cavities called the right and left auricle, and the right and left ventricle. The right auricle is larger than the left, and the left ventricle is larger

than the right. The right auricle holds about two ounces, and receives through two large veins the dark venous blood from the entire body.

The vein through which the blood from the upper half of the body enters the right auricle, is called superior vena cava, and from the lower half of the body, inferior vena cava. The blood which nourishes the heart itself is returned to the right auricle through what is called the coronary sinus.

The dark venous blood passes from the right auricle into the right ventricle, and from the right ventricle it passes through the pulmonary artery into the lungs, where it becomes arterialized, or purified, by receiving oxygen from the air. Its color is then changed to a bright scarlet, and it passes through the pulmonary veins to the left auricle, from which it passes to the left ventricle; from the left ventricle it passes into the aorta, the largest artery of the body, and through its subdivisions is distributed throughout the entire body for nutrition, preservation of life, generation of heat, and the secretion of the different fluids.

The blood expends its vital and constructive properties in its journey through the body, and becomes dark colored and impure; it is then called venous blood.

The capillaries collect the blood distributed by the arteries, and the veins return it from all

parts of the body back to the two large veins already mentioned, which return it to the right auricle of the heart. This complete passage of the blood constitutes its circulation.

The openings both of entrance and exit of the heart, as well as the openings between the auricles and ventricles through which the blood passes, are guarded by valves.

The contraction and relaxation of the heart constitutes what is called its pulsation. The action of the arteries, called the pulse, corresponds with that of the heart, and is effected by the contraction of their muscular and great elasticity of their external coat. The blood leaves the heart when it contracts, and enters when it relaxes.

The Arteries. The arteries, the cylindrical elastic canals, which serve to convey the blood to every part of the body, were named arteries by the ancients because they supposed that they contained.

The name artery was first given to the trachea, or windpipe, which conveys the air to the lungs, and afterwards the same name was given to the arteries because nothing but air is found in them when opening a dead body — the blood collecting in clots.

Galen, who flourished in the second century, was the first physician who showed that they contained blood in the living body; but Harvey, an English

physician, was the first who discovered that the blood circulated. The discovery was made in the seventeenth century.

The aorta, the main arterial trunk, commences at the upper part of the left ventricle, and after ascending about two inches arches back over the root of the lungs, and descending on the left side of the vertebral column, it passes through the diaphragm; opposite the fourth lumbar vertebræ it terminates in the right and left common iliac arteries. It is divided into the arch, the thoracic and abdominal aorta.

The distribution of the arteries throughout the body is like a highly ramified tree; the aorta the trunk in the centre, and the branches in every part of the body excepting the nails, hair, epidermis, cartilages and cornea. Larger arterial branches or trunks usually occupy protected situations, and in the divisions of arteries a short trunk occasionally subdivides into several branches at the same point, or the vessel may give off several branches in succession and still continue as the same trunk. The division between them, however, is usually dichotomous, as, for instance, the aorta dividing into two common iliacs.

Arteries that freely communicate with each other form what is called an anastomosis or inosculation; this occurs where great freedom and activity of the circulation is required, as in the

brain, around the joints of limbs, etc. The larger arterial branches throughout the body pursue a perfectly straight course, but in certain situations, as in the arteries of the face and lips, they are tortuous and accommodate themselves to the movements of the parts.

From the ascending part of the aorta are given off two small arteries called coronary, which convey blood to nourish the heart; from the transverse portion of the arch are given off three arteries called arteria innominata, left common carotid, and left subclavian. The arteria innominata, the largest but shortest of these branches, is about two inches in length, and divides into the right sub-clavian and right common carotid. The common carotid arteries on each side branch into the external and internal carotid arteries. Eight branches are given off from the external carotid which are the superior-thyroid, lingual, facial, occipital, posterior auricular, ascending pharyngeal, temporal and internal maxillary, distributed as indicated by their names. The internal carotid passes up in the cranium, pierces the dura mater, and supplies the front portion of the brain and the eye and its appendages.

The sub-clavian artery, so called because it is beneath the clavicle or collar bone, extends to the outer border of the first rib; its continuation to the outer border of the axilla or arm-pit is called the axillary

artery ; and its extension to the bend of the elbow is called the brachial artery. At the elbow the brachial artery divides into the radial and ulnar arteries, which with their branches supply the forearm and hand. There are four branches of the sub-clavian artery, seven of the axillary, and five of the brachial. Those of the radial are twelve, and of the ulna nine, which are divided into three groups : those of the forearm, wrist and hand. The largest and most important branch of the sub-clavian is the vertebral artery which passes up through foramina in the transverse process of the six upper vertebræ, and enters the cranium, where it unites with the opposite vertebral and forms the basilar artery at the base of the brain. The vertebral gives off two branches in the neck and four within the cranium. The anastomosis at the base of the brain between the basilar artery and branches of the internal carotid, form what is called the circle of Willis.

The thoracic aorta give off pericardiac, bronchial, œsophageal, posterior mediastinal and intercostal branches distributed as indicated by their names.

The abdominal aorta after giving off branches to the internal viscera and walls of the abdomen, is divided into the right and left common iliac arteries. The internal iliac with its branches supplies the viscera and walls of the pelvis, the generative organs, and the inner side of the thigh. The external iliac is larger than the inter-

nal in the adult, and is the chief vessel which supplies the lower limb. It gives off several branches, and its continuation down the thigh is called the femoral and popliteal, both of which have several branches. The popliteal divides into the anterior and posterior tibial arteries, which, with their branches, supply the leg, ankle and foot.

The Capillaries. The capillaries, or capillary vessels, so called from their hair-like minuteness, are the connection between the extremities of the arteries and the veins, carrying blood from one to the other in every part of the body. They are too small to be seen with the naked eye, but it is in them that the carbonization of blood is effected, the animal heat produced, and from them that the bile, sweat and urine are secreted.

The capillaries inosculate with each other in every direction, and form an interlacing network, or capillary plexus, as it is termed. The walls of the capillaries are exceedingly thin and delicate, and the ingredients of the blood necessary for the nourishment of the organs and tissues of the body, slowly transude through them, and are absorbed in such proportion as is required.

The Veins. The veins are continuous with the minute capillaries, and as they approach the heart they unite into larger and fewer tubes, until at last they terminate in the two large veins pre-

viously mentioned, through which is conveyed the blood from the upper and lower half of the body into the right auricle of the heart.

The veins are larger, more numerous, and their capacity is greater than the arteries. They do not pulsate like the arteries, and the blood flows through them more slowly; they have valves which allow the blood to pass toward the heart and prevent it flowing backward. They communicate very freely with each other, and are divided into three sets: superficial, deep and sinuses.

The superficial or cutaneous veins return the blood from the skin and fascia and communicate with the deep veins by perforating the deep fascia.

The deep veins are enclosed in the same sheath with the arteries, and usually accompany the smaller arteries, as the radial, ulnar, brachial, tibial and peroneal, in pairs, one on each side. Only one vein usually accompanies the larger arteries, as the axillary, sub-clavian, popliteal, and femoral. The deep veins do not accompany the arteries in certain parts of the body, as in the skull, spinal canal, hepatic veins of the liver and the larger veins returning blood from the bony tissue. Sinuses are venous channels found in the interior of the skull, formed by a separation of the layers of the dura mater.

The Portal System. The portal system is com-

posed of four large veins which collect the blood from the small veins proceeding from every part of the bowels and the membranes that surround them. The four veins unite and form one large trunk called the vena portæ, or portal vein, which enters the liver and divides and subdivides till it is diffused over the substance of the gland in the most minute ramifications. The blood thus brought to the liver is the darkest and most impure in the system, but it is charged with the nutritious materials from the viscera of digestion. As it passes through the liver it is subject to the action of certain secreting vessels which separate from it much of its carbon and other impurities, and forms a new substance called bile. At the capillary terminations of the portal vein are formed the three hepatic veins which carry the blood from the liver to the inferior vena cava.

Systemic and Pulmonic Arteries and Veins. The arteries which convey the blood from the left ventricle of the heart throughout the body, and the veins which return the blood from all parts of the body to the right auricle of the heart, are the greater, systematic or systemic arteries and veins, and the blood circulating through them is called the systemic circulation.

The pulmonary artery which conveys the blood from the right ventricle of the heart to the lungs,

and the four pulmonary veins which return the blood from the lungs to the left auricle of the heart, belong to the pulmonic or lesser system, and the blood circulating through this system is called the pulmonic circulation.

The Lymphatics. The lymphatics are delicate transparent vessels containing a fluid called lymph from its resemblance to water; hence the name of the vessels, lymphatics. As they absorb certain materials from the tissues and convey it into the circulation, they are also called absorbent vessels. They have been found in nearly every part of the body excepting the substance of the brain, spinal cord, cartilages and tendons, and are arranged into a superficial and deep set. The superficial accompany the superficial veins on the surface of the body, and by perforating the deep fascia join the deep lymphatics, which are larger than the superficial, fewer in number, and accompany the deep bloodvessels.

The lymphatics are smaller than the veins, but they exceed the veins in number, and their anastomoses, especially those of the larger vessels, are more frequent. In the course of the lymphatic vessels, but more especially in the neck, axilla, groin and abdomen, are found numerous small glandular bodies called lymphatic or absorbent glands, through which the lymphatic and lacteal vessels pass. The lacteal vessels are the lym-

phatic vessels of the small intestine, called lacteal, because during digestion they absorb and carry into the circulation the chyle, a milk-white nutritious fluid. These lacteal vessels together with the lymphatics coming from the stomach, liver, spleen, kidneys, loins, and those passing into the abdominal cavity from the legs and thighs, empty into a single tube or duct called thoracic, which extends from the second lumbar vertebræ to the root of the neck, and terminates at the angle of junction of the left internal jugular and sub-clavian veins, where it empties into the circulation.

The thoracic duct commences in the abdomen by a triangular dilatation called the receptaculum chyli, and the length of the entire duct varies from eighteen to twenty inches. All the lymphatics of the left side of the head, neck, and entire left side, as well as all those of the lower part of the body and limbs, empty into the thoracic duct. The lymphatics of the right arm, right side of the head, neck, thorax, right lung and right side of the heart empty into the right lymphatic duct, which terminates at the angle of union of the right sub-clavian, and right internal jugular veins, into which it empties.

The openings both of the thoracic and right lymphatic duct into the veins are guarded by valves which prevent blood entering the ducts;

and the lymphatics in all parts of the body, like the veins, are provided with valves.

The lymphatics absorb and carry away in the form of lymph those ingredients of the tissues which have become useless and need purifying. The lymph finds its way to the thoracic and right lymphatic ducts and through them into the veins where it becomes intermingled with the venous blood. It is renovated and restored with the blood by its passage through the heart and lungs before it again takes part in the functions of life.

The arteries carry to a part blood purified by receiving oxygen from the air in the lungs, and they deposit fresh nutritious matter, while the veins and absorbents carry away the impure blood and old worn-out material; thus the human body is undergoing a constant change. These two sets of vessels are equally active during the middle period of life. The arteries carry and deposit sufficient nutritious matter to build up the body as fast as it is worn out and carried away by the veins and absorbents; but during the early period of life and the period of growth, more nutritious matter is brought and deposited by the arteries than is taken away by the veins and absorbents.

When the lymphatics are excessively active and absorption predominates the body wastes away,

becomes lean and diminishes in weight; but when the arteries deposit more nutritive matter than is taken away, the body grows fat, plump, and increases in weight.

Exercise causes a waste of old atoms of flesh and increases the demand for new; it causes an increased quantity of food to be eaten and digested so that the blood may receive more chyle and thus supply the demand for an increased amount of nutritious matter. The active growing youth and the laborer therefore require more food than the indolent or aged.

VI. — ADIPOSE TISSUE OR FAT.

Adipose tissue or fat consists of a number of vesicles or sacs, each one composed of an extremely delicate transparent membrane forming a closed cavity in which the oily matter is contained. These vessels are held together by capillary blood-vessels and fine connective tissue.

Adipose tissue is found in nearly all parts of the body, but in certain localities more abundant than others; it gives that roundness and plumpness to the body which imparts symmetry and beauty to the appearance. In the decline of life when it is absorbed, hollows, cavities and wrinkles, so antagonistic to beauty, are left.

Adipose tissue acts as a soft and delicate cushion to certain parts, which if left unprotected would be exposed to injury or inconvenience; it also serves to retain the warmth of the body; therefore those persons who are thin and emaciated suffer more from exposure to cold than those provided with adipose tissue. Adipose tissue in addition to its other uses, adds to the specific lightness and gives elasticity to the body and assists in keeping it from sinking in water

Fat is fluid in the living, but solid in the dead body. Although a certain amount of fat is really necessary to the well-being of the body, it is sometimes generated in such quantities that the body assumes that state of corpulence called obesity, which is a diseased condition in which there is so much fat that it interferes with the healthy functions of the body and it becomes sluggish and unwieldy.

The amount of adipose tissue necessary to health varies with the climate — hot climates require less than cold; therefore nature to a certain extent regulates itself in this respect, for in most persons adipose tissue is diminished in summer and increased in winter. (See Man's Stature and Weight — Their Relation to Health.)

VII.—THE BLOOD.

The blood, the most important fluid of the body, is assisted in supplying the body with nutrition by the lymph, chyle, saliva, gastric-juice, bile, and intestinal secretion.

The blood in the arteries is always of a bright scarlet, while that in the veins is always of a dark-red color; the same blood is constantly changing color in the circulation and is alternately bright scarlet and dark-red as it passes from one set of vessels to the other.

Water, albumen, fibrine and mineral substance enter into the composition of the blood and are its most important ingredients. (See Morbid States of the Blood.) After blood is taken from the body and allowed to stand it soon separates into two parts; one is a fluid called serum, and the other is the clot or coagulum; the latter is due to the fibrine. When a bloodvessel is cut or injured the fibrine by coagulating stops the flow of blood; but if the injury is severe it requires assistance in the form of compression, styptics, or a ligature. (See Hemorrhage.)

The quantity of blood in a living healthy body is about one eighth part of its weight; therefore a man weighing one hundred and sixty pounds has about twenty pounds of blood; but the quantity and composition of blood varies somewhat at different times. After digestion it has absorbed the nutritious materials from the food, which must pass through the blood to reach the tissues, and the quantity of blood, therefore, at such times is increased.

As a rule no harm results from the loss of a small quantity of blood, but the loss of a pound usually causes faintness. The loss of two pounds is followed by complete unconsciousness, and if a much larger quantity is lost recovery is impossible; but if the bleeding is stopped the patient usually recovers. Where the vital powers are nearly exhausted by extreme loss of blood, life may be restored by an operation called the "transfusion of blood," which consists of injecting in the patient's bloodvessels healthy blood from another person.

When blood is examined under the microscope, red and white corpuscles are seen floating in the fluid; the red being the most numerous. As human blood corpuscles differ in appearance from those of animals, the microscopic examinations of blood stains has furnished important evidence in murder trials.

VIII. — THE ALIMENTARY CANAL. — THE SALIVARY GLANDS.

The musculo-membranous tube from thirty to thirty-five feet in length, extending from the mouth to the anus, is called the alimentary canal; it is divided into different compartments or cavities which communicate with each other by narrow orifices.

The mouth at its commencement is the cavity in which mastication, the mechanical division of food, and insalivation, its admixture with a fluid called saliva, takes place. The organs of deglutition, the pharynx and œsophagus then convey the food into a second cavity, the stomach, in which it comes in contact with the gastric juice, and in which the reduction and solution of food, and its principal chemical changes occur. Then comes the small intestine from twenty to twenty-five feet in length, divided into three portions; the duodenum, the jejunum and ileum. In the duodenum are found the orifices of the biliary and pancreatic ducts.

The food becomes mixed with the bile and pancreatic fluid in the small intestine, and the chyle, the nutritious principle of food, is separated from

that portion which passes into the large intestine, most of which is expelled from the system. The large intestine, about five feet in length, is separated from the small intestine by the ileo-cæcal valve, and is divided into three portions: the cæcum, colon and rectum; the latter being the lower portion, six or eight inches in length, terminating by the anus, at which is situated a double sphincter muscle for the purpose of guarding the orifice.

The Salivary Glands. The fluid by which the mouth and tongue are constantly moistened in their natural state is called the saliva. It is colorless, tasteless and odorless, and is poured into the cavity of the mouth by the parotid, submaxillary and sublingual glands.

The paroted is the largest and the sublingual the smallest of the three glands. The former derives its name from being placed near the ear, and the latter from its being beneath the tongue. The submaxillary is situated at the inner side of the ramus and body of the lower jaw bone.

The saliva keeps the mouth moist at all times, but chewing excites it to flow in larger quantities. An inflammation of the parotid and submaxillary glands, of a contagious or epidemic origin, is called parotitis or mumps.

IX.—THE LIVER.—THE PANCREAS.

The liver, the largest gland in the body, weighs from three to four pounds. It is situated in the upper part, and chiefly on the right side of the abdomen. In a state of health its upper border is about two fingers' breadth, or less, below the right nipple, and its lower border a fingers' breadth beyond the ribs, below, in front. The organ extends to the left in the epigastric region, about three inches from the middle line, and to about midway between the breastbone and navel. It has five ligaments, five fissures, five lobes, and five vessels. Four of the ligaments are formed of folds of peritoneum, and the fifth results from the obliteration of the umbilical vein. The five fissures are on the under surface of the liver, and divide the organ into five lobes; the right is the largest, the left next, and the others are less important. The five vessels are the hepatic artery, portal vein, hepatic vein, hepatic ducts, and lymphatics.

The substance of the liver is made up of a large number of minute lobules held together by an extremely fine areolar tissue; and of the ramifications of the portal vein, hepatic duct, artery

and veins, and the lymphatics and nerves; the whole covered by a fibrous and serous coat.

All the biliary ducts of the liver unite and form two which, uniting, form the hepatic duct, which joins the duct of the gall-bladder, forming what is called the ductus communis choledochus, the common biliary duct, which empties into that portion of the small intestines called the duodenum.

The liver secretes between two and three pounds of a dark-colored fluid, called bile, every day but the largest quantity of bile is secreted during digestion (see The Portal System). The gall-bladder, a pear-shaped membranous sac, the reservoir for the bile, lies under the liver, and holds a little over one ounce. (See Gall-stones.) The liver in addition to secreting bile, transforms a part of the nutritious materials received from the blood into sugar, which is absorbed by the blood-vessels, and passes upward to the heart into the circulation. (See Diseases of the Liver.)

The Pancreas, a conglomerate gland, similar to the salivary glands, is situated near, and a little behind the lower border of the stomach. It is six to eight inches in length, one inch and a half in breadth, and from half an inch to an inch thick. Its body tapers toward the left extremity, where it terminates at the spleen. The pancreas secretes a fluid resembling saliva, called pancreatic juice, which passes through a duct, and enters the small intestine where it assists in the digestion of food.

X.—ALIMENTATION.

Alimentation, the act of nourishing, includes after taking food, mastication, insalivation, deglutition, digestion, absorption, assimulation, and the result of these nutrition.

Mastication and Insalivation. Mastication and insalivation are accomplished together. The food is chewed, trituated and divided in the mouth, and at the same time thoroughly moistened with saliva. Imperfect mastication causes indigestion, therefore it is necessary that it should be properly performed that digestion may be easily accomplished. The saliva by mixing with the food assists mastication deglutition and digestion.

Deglutition. After food is masticated and insalivated it is forced by the muscles of the tongue and palate through the fauces, and over the epiglottis into the pharynx; the constrictor muscles of the latter forcing it into the œsophagus which contracting propels it downward into the stomach. This constitutes deglutition, or the act of swallowing.

Digestion. After food has been trituated and

softened in the mouth, it is necessary that it should undergo a process of digestion or liquefaction before it can be taken into the blood.

The stomach is composed of two principal parts —a muscular coat and a lining membrane. When food enters the stomach it stimulates the muscular coat to what is called peristaltic action, which keeps the food in motion and carries it around by a kind of churning movement. The presence of food, and the motion of the muscular coat, causes a fluid called gastric juice, which is an acid solution containing pepsine, to be poured out from the lining membrane of the stomach, like sweat from the skin of the body. The gastric juice becomes thoroughly mixed with the food and assisted by the peristaltic action of the stomach dissolves it and converts the albuminous substances into albuminose. The starchy and oily ingredients are dissolved in the stomach but otherwise remain unchanged. They, together with the albuminose, mixed with the gastric juice, form a fluid called chyme, which passes out of the stomach into the intestine, where the bile, pancreatic juice, and intestinal secretion, complete its digestion. The fatty, oily ingredients are changed by the pancreatic juice into an emulsion, a milky looking fluid, called chyle, and the starch is converted into sugar by the mixed intestinal secretions.

While the food, mingled with the digestive

fluids, is undergoing digestion, it is carried slowly downward by the peristaltic action of the intestine's muscular coat; and as fast as it becomes thoroughly digested, liquefied, and converted into materials fit for absorption, it is taken up from the intestine's lining membrane, by the vessels, and carried into the circulation.

The indigestible matter, together with the refuse of the intestinal secretions — the remains after absorption of the nutritious materials — gradually acquire a firmer consistency as the fluids have been absorbed and are discharged from the intestines in the form of feces.

The time required for digestion varies with age, temperament, the condition of the stomach, the article of food and the way it is cooked, (see Different Kinds of Food and their mode of Preparation.) That digestion may be properly performed, food should be taken only when the appetite craves it, at regular intervals if possible, and it should be properly cooked, thoroughly masticated, and both the mind and body should be free from any unusual or unpleasant excitement during the process. (See Facts and Fallacies Concerning Eating and Drinking.)

Absorption. The digested fluids, the solution of albuminose, of sugar, and the milky looking chyle, are absorbed partly by bloodvessels and partly by the lacteals. That portion absorbed by the

bloodvessels is carried away with the circulation, and that taken up by the lacteals, which is the chyle, pass through the mesenteric glands and then through the thoracic duct into the circulation.

The force by which certain fluids are impelled through the substance of animal membranes is called osmosis; when they transude from within outward exosmosis, and from without inward endosmosis. These actions take place in absorption.

Assimilation. The act by which the body appropriates the digested fluids and transforms them into its own substance is called assimilation.

The nutritive elements are first mingled with the blood, and after undergoing certain changes are distributed to all parts of the body, each organ, structure or tissue, drawing, or assimilating, the materials fitted for its growth and support, choosing the molecules identical with its own nature.

Assimilation may be modified in the progress of its work by various circumstances; it may be retarded, rendered active, or changed in its direction, as is seen in certain diseases when nutrition is almost entirely arrested, and in others when certain tissues change their nature. Assimilation does not take place with the same rapidity in all parts of the body, for certain parts increases more rapidly than others.

Nutrition. This is the final result of the preceding acts described under the head of alimentation. Some writers use the word nutrition to express all the actions by which composition and decomposition are accomplished in the body, including under the head digestion, absorption, respiration, circulation, assimilation and excretion; but nutrition is a term that should be applied more especially to the direct appropriation of the nutritious parts of the blood to the building up of the various parts of the body; and in this sense comprises formation, growth, development and repair. Formation in embryonic life, growth and development, until maturity, after which the only result of nutrition is repair of the parts of the body destroyed in active or passive waste, disease or injury.

That healthy nutrition may be affected, it is necessary that there should be a sufficient supply of blood of good quality, a proper supply of nerve force and functional exercise, with appropriate intervals of repose.

XI. — THE SPLEEN.

The spleen is a ductless gland near the left extremity of the stomach, opposite the tenth and eleventh ribs. It is oblong, flattened, rounded, and of a dark bluish-red color. Its size and weight varies under different conditions and at different periods of life; its weight in a healthy adult varies from four to ten ounces. It is small in half-starved individuals, decreases in weight in old age, but is large in the glutton, and increases in size during digestion. In certain fevers it becomes enlarged, and sometimes weighs from eighteen to twenty pounds.

The uses of the spleen are not exactly known. It is probable that its function is shared by other glandular organs, for it has been removed from animals without producing any permanent injury other than to excessively develop tne appetite, and cause an unnatural ferocity of disposition.

The ancients regarded it to be the seat of anger and melancholy; hence the terms spleeny, spleenful, etc., applied to persons of a cross and

ugly disposition; but modern investigation has shown that the nervous system is at fault in hypochondria, and in those who have a grouty, fretful disposition. The spleen probably assists in the formation of blood.

XII.—LARYNX OR ORGAN OF VOICE.—THE TRACHEA.

The larynx, the organ of voice, situated at the upper part of the air passage, is shaped like a triangular box, and is formed by nine cartilages. The thyroid, the largest cartilage, has a prominence especially in men, called Adam's apple, from a notion that it was caused by the apple sticking in the throat of our first parent.

The vocal cords are two elastic bands of fibrous tissue in the upper portion of the internal cavity of the larynx. The upper opening of the larynx is termed the glottis, and it communicates with the pharynx, the upper part of the passage leading from the mouth to the stomach.

The glottis is completely covered over during the act of swallowing by a thin, leaf-like lid of fibro-cartilage, called the epiglottis. During the act of breathing the epiglottis is directed vertically upward, and air is freely admitted to the passage leading to the lungs.

The larynx, in opening and closing the glottis, is moved by numerous muscles, and during deglutition

it is drawn up beneath the base of the tongue (as can be felt by placing the fingers on "Adam's apple") which closes the epiglottis backward over the glottis, and prevents the food and drink entering the air passage, but allows it to pass through the pharynx and œsophagus into the stomach; still, a sudden inspiration, taken as in laughing or talking, at the same instant food is swallowed, will sometimes permit a small particle to get between the vocal cords, and pass down in the larynx; the sensitive lining membrane then becomes irritated, and the muscles are excited to spasmodic efforts of coughing, which usually expels the substance.

When the sound of the human voice is produced, the vocal cords are drawn together, tightly stretched, and as they are elastic they are thrown into vibrations by currents of air passing from the lungs, which is the "wind box," so to speak, of the larynx. The tongue, palate, lips and teeth take part in articulation, which is as necessary as voice, in speech. As the vocal cords are more or less tightly stretched, and as the orifice of the glottis is narrower or wider, the note sounded by the voice is high or low, acute or grave.

The Trachea or air tube, commonly called windpipe, is formed of cartilaginous rings and an elastic ligamentous membrane. Its length is about four and one-half inches, and diameter, which is greater

in males than females, is about one inch. It extends from the lower part of the larynx to opposite the fourth dorsal vertebræ, where it divides into the right and left bronchi — one for each lung. The two bronchi are divided into smaller branches, called the bronchial tubes, which continue to separate into smaller branches and ramifications, constructed similar to the trachea; but when the branches become very minute they have no cartilaginous rings and are entirely membranous. These small branches terminate in innumerable air cells in the lungs, which communicate with each other and give the lungs a spongy appearance. The air passes from without through the nostrils and mouth, the larynx, trachea, bronchi, and successive divisions of the bronchial tubes, and reaches the air cells in the lungs. (See Respiration.)

XIII.—THE LUNGS.

The two lungs are large conical-shaped vascular organs weighing about forty-two ounces, and occupying the greater part of the cavity of the chest. They are separated from each other by the heart, large bloodvessels, and the two layers of pluræ —the membrane which surrounds them. The pluræ forms a space in the median line called mediastinum.

Males have larger lungs than females, and the right lung is larger than the left. The substance of the lungs is soft, light, porous or spongy, and on the walls of the aircells the blood circulates in a network of capillaries and is purified by receiving oxygen from the inspired air.

The lungs, perhaps, are more liable to disease than any other part of the body, owing to the frequent variations in temperature of the air inhaled, their highly organized structure, and their incessant exercise. (See Diseases of the Organs of Respiration and Circulation.)

Respiration. The alternate inspiration and expiration of atmospheric air is called respiration, or the act of breathing. Its object is to bring the air in contact with the blood, that the blood may

become arterialized or renovated by giving off carbonic acid with the expired air and receive oxygen from the inspired air.

The movements of respiration are accomplished as follows: The intercostal muscles elevate the ribs, which expands the chest, and takes the pressure from the outside of the lungs, and the diaphragm is depressed by its own contraction, and the chest is thus enlarged in all directions; at the same time the air enters the mouth or nostrils and rushes through the air passages and fills the cells in the lungs. This constitutes the act of inspiration. It is immediately followed by expiration, which does not require any positive effort of muscular contraction, for the weight of the ribs causes them to fall and the elasticity of the diaphragm makes it ascend; the lungs are thus compressed and the air is expelled. (See Most Important Nerves of the Body.)

Prof. Dunglison in his Dictionary of Medical Science says: "In the healthy condition the respiration is easy, gentle, regular, and without noise. In man, the respirations are generally about thirty-five per minute in the first year of life; twenty-five during the second; twenty at puberty and eighteen in the adult.

"The air of respiration has been divided into *first*, the *residual air*, or that which cannot be expelled from the lungs, but remains after a full

and forcible expiration, estimated at one hundred and twenty cubic inches; *secondly*, the *supplementary* or *reserve air*, or that which can be expelled by a forcible expiration, after an ordinary outbreathing, valued at one hundred and thirty cubic inches; *thirdly*, the *breath*, or *tidal* or *breathing* air, valued at twenty-six cubic inches; and *fourthly*, the *complementary* or *complemental air*, or that which can be inhaled after an ordinary inspiration, which amounts to one hundred cubic inches. This estimate gives two hundred and fifty cubic inches as the average volume of air which the chest contains after an ordinary expiration."

The atmosphere is a mixture of oxygen and nitrogen — four fifths by weight of the latter to one fifth of the former — but it also contains carbonic acid and watery vapor in small quantities which vary with the locality and temperature.

Air is decomposed when brought in contact with the blood in the lungs, and its oxygen unites with the blood while its nitrogen is returned by expiration, unchanged, with an additional quantity of carbonic acid gas and watery vapor. The increase of carbonic acid may be shown by breathing into clear lime-water, to which it gives a milky turbidness; the vapor or water in the breath is made known by its condensing in a cloud near the nostrils or mouth when in the open air on a cold day.

The blood which is distributed to the lungs is

that which has circulated through the various parts of the body, and rendered unfit by various influences during its flow for the support of vital energy. It has served for the nutrition of the various organs and tissues, and is of a dark crimson or purple color. After it enters the lungs it gives off carbonic acid and absorbs oxygen from the air-vesicles, and is instantly changed to a brilliant scarlet color. The blood when it leaves the lungs is, therefore, entirely different in its appearance and properties than when it enters them. (See The Blood and Pure Air — Its Necessity.)

Animal Heat. Animal heat is the result of a chemico-vital process; or, in other words, it is the result of the chemical changes of nutrition going on in the body. The oxygen, which is carried by the blood to all parts of the body, combines with carbon and hydrogen in the little capillary vessels, forming carbonic acid and watery vapor, which is expelled with the breath. The process is a form of combustion in which the waste matter of the body is the fuel.

The temperature of the interior of the body is about 100° F.; under the tongue it is about 99° F.; in the axilla about 98° F.; and in the folds of the skin in the palm of the hand about 97° F. Children have a temperature two or three degrees higher. In certain diseases, as scarlet fever, yellow fever, typhoid fever, etc., the temperature of

the body is increased, and in certain other diseases, as cholera, etc., it is diminished.

The temperature of the body is regulated by the perspiration, and in health remains the same in winter and in summer, in the torrid and in the frigid zones; still the thinner and more exposed parts, as the ears, nose, fingers, etc., may be cooled down below the standard temperature, and may be congealed if the cold is severe. Although the temperature of the blood and internal organs remains the same as long as the body is in a state of healthy activity, should the exposure to cold be so great and long-continued that the loss of animal heat is more rapid than its production, the temperature of the blood begins to fall and the individual becomes gradually torpid and insensible in proportion as the warmth of the body diminishes, and death finally results.

During the winter months we eat more fatty food than in the summer, and people inhabiting very cold countries consume large quantities of fatty and oily substances, the carbon and hydrogen of which are probably required for the production of the necessary heat of the body. Animal heat is prevented from being dissipated by clothing which has no warmth in itself, but is a protection from cold, because of its non-conducting property.

XIV.—THE URINARY ORGANS.

Two secreting organs, the kidneys, one receiving organ, the bladder, two connecting tubes, the ureters, between the springs and the reservoir, and one outlet or canal, the urethra, comprise the urinary organs.

The Kidneys. The two kidneys are situated in the lumbar region, one on each side of the spine, extending from the eleventh rib to near the crest of the ileum. They are retained in their position by the vessels which pass to and from them.

Each kidney in the adult is about four inches long by two in width, and one in thickness; the weight of each varies from four and a half to six ounces in the male, and about half an ounce less in the female. They are surmounted by the supra-renal capsule and surrounded by fat. They are of a brownish-red color and are covered by a firm, thin, transparent, cellular envelope, and are composed of an exterior or corticle substance, and an interior or medullary substance.

The corticle substance forms about three fourths of the kidney, and is the seat of the greater part

of the secretory process. It is made up of a great number of uriniferous tubes convoluted and inosculating with each other; scattered through the plexus formed by these tubes and bloodvessels, are dark points called Malpighian (after their discoverer) bodies These bodies are convoluted masses of minute bloodvessels included in flask-like dilatations of uriniferous tubes forming a close relation between the circulating and secreting systems. The medullary substance is denser in structure and darker in color than the corticle, and consists principally of tubes passing nearly straight inward to the central receptacle of the secretion.

The kidneys drain the system of superabundant water, and next to the lungs are the great organs of purification for the blood which is constantly passing into them through the renal arteries which come directly from the aorta. The arteries after entering the kidneys, divide into minute branches, and the blood undergoes a change as it passes through the Malpighian capillaries; the superfluous water and some saline bodies — the waste and exhausted materials — are separated from it, after which it is returned to the circulation by means of a vein which terminates in the ascending vena cava. After the water is strained from the blood it is conveyed by the uriniferous tubes into what is called the pelvis of the kidney. (See Diseases of the Kidneys.)

The Ureters. The two cylindrical membranous tubes, sixteen to eighteen inches in length, and of the diameter of a goosequill, which conveys the urine from the kidneys to the bladder, are called ureters.

The ureter on either side proceeds from the pelvis of the kidney, of which it is the continuation, and descending through the abdomen to the base of the bladder, into which it opens by a constricted orifice, after passing obliquely for nearly an inch between its muscular and mucous coat. The entrance of the two ureters are about two inches apart, and they are so arranged that it is impossible for the urine to be returned after it once passes into the bladder.

The Bladder. The bladder is a musculo-membranous reservoir intended for the reception of the urine until the accumulation of a certain quantity demands its expulsion. It is situated in the pelvis behind the pubis, and in front of the rectum in the male; in the female the uterus and vagina intervenes between it and the rectum.

The shape, position and relations, of the bladder varies in accordance with age, sex, and degree of distension of the organ. Its capacity, as a rule, increases with age, and is greater in females than in males, but is modified in different individuals by their habits and the natural exercise of its functions. The capacity of the bladder is changed

more frequently by disease, than any other cause. Long-continued irritation of the bladder may reduce it to such a state that it will not contain more than a few drops of urine, and on the contrary, when its contents cannot be evacuated, it may be distended so as to contain an enormous quantity Its ordinary capacity may be estimated at a pint, or pint and a half.

The narrow part of the bladder connected with the urethra is called its neck or cervix. In the male it is surrounded by the prostrate gland, which in shape and size resembles a horsechestnut, and secretes a milky-looking fluid.

The Urethra. The urethra is a membranous canal through which the urine passes out of the body. Its length is eight or nine inches in the male, and about an inch and a half in the female.

XV.—THE GENERATIVE ORGANS.

The function of generation is performed by means of two sets of organs, belonging to the two different sexes, called male and female organs of generation; but as this book is intended for general reading by all classes of people, the writer omits for obvious reasons, an anatomical description of them.

In the generation of animals and plants, as well as a human being, it is necessary that two cells, called the germ cell and the sperm cell, should take part. The process of growth of the new being commences in the former, while the latter communicates the growing tendency to it. These cells are the product of the two different organs of generation.

Reproduction. Reproduction is a term which implies the production, growth and development of the new germs which make their appearance by generation; but is also used to denote those processes by which the individual being is developed and maintained. In the latter sense it comprises the result of the ordinary processes of nutrition, which is the constant reproduction of

the same tissue, in the same parts, and is the means by which the form of the body is maintained during life.

A plant germinates, grows, blossoms, bears fruit, withers and dies. An animal or human being is formed from a cell which develops into an embryo, which in case of a human embryo, becomes a child which is nourished and brought to maturity, when it may reproduce its kind, after which it declines and dies. While individual organisms are constantly perishing and disappearing, it is through reproduction that the particular kind or species remains in existence, and the different races of men since the earliest time known, have thus remained without any essential alteration.

Wherever plants or animals exist, they of course indicate the previous existence of others belonging to the same species, and if the whole species should be destroyed in any particular locality, no new individuals can be produced there unless by the previous importation of others of the same kind.

Development. Development of a human being commences with the earliest organization of the embryonic tissues and ends with the complete formation of the adult body.

The period of birth marks only a single epoch in a constant series of changes. The writer will not describe those changes which precede birth,

but will commence with the new-born infant, which is very far from having arrived at a state of complete development.

The general condition of the infant at birth, the condition of the skeleton, spinal column and skull, are described by Professor Dalton in his treatise on Physiology and Hygiene for schools, families and colleges, as follows:

"The weight of the newly-born infant is between six and seven pounds. The head and arms are larger, and the pelvis and lower extremities smaller, in proportion to each other, than in the adult. The legs are curved inward at their lower part, so that the soles of the feet are not horizontal, but look obliquely inward toward each other. Even if the infant were strong enough, therefore, it could not walk, since the feet would not rest upon the ground by their soles, but by their outer edges. Both arms and legs also are habitually curled upward and forward over the chest and abdomen, and are not easily straightened.

"The skeleton at birth is soft and yielding, being composed to a great extent of cartilage. Some of the bones have already begun to show themselves in the interior of these cartilages; but they are nearly all small and delicate, and many of them are still cartilaginous throughout. The bony parts, however, continue to enlarge at the expense of the cartilage, until at the end of some years after

birth, the whole has been converted into the tissue of bone. This gradual change of the parts from the cartilaginous to the bony condition is called the *ossification* of the skeleton.

"At birth each bone of the spinal column consists of three separate pieces; viz., one in front of the spinal cord, and one on each side behind it. These pieces are, of course, connected with each other by cartilage, and thus envelop the spinal cord with a series of soft and elastic rings.

"The bones of the skull are very thin and flexible, and their edges are not yet united with each other. The skull of the infant, therefore, is not a firm and solid case like that of the adult, but rather an elastic bag, formed of separate plates, held together by the skin and fibrous membranes. A remarkable peculiarity of the skull at this time is that there are two openings in the bony parts, one at the back and one on the top of the head, where the brain is only covered by the skin and other soft tissues. These openings are called the *fontanelles*, because we can feel the pulsations of the brain through them, like the bubbling of water in a fountain."

As the bony parts around the fontanelles become developed, the openings gradually diminish in size, and at the age of four years after birth are completely closed.

Respiration is imperfectly performed for some time after birth; breathing through the pores of

the skin is more active, but by the lungs less so than in later life. The lungs do not fully expand at once, and it is several days before the air penetrates into all the vesicles of their deeper parts. The power of generating animal heat is also less than later in life, and the warmth of the body should be preserved by soft clothing and communicated heat. The skin and alimentary canal are extremely delicate and impressible, the functions of digestion and nutrition active, and the nerves of the special sense of sight, hearing, taste and smell are comparatively inactive. The consciousness and will are feeble and intelligence dormant, but the involuntary and reflex nervous actions are highly developed, and nearly all the infant's actions and movements of its limbs are of a reflex nature.

The nervous system of the young infant is almost entirely subservient to the process of development, and its time is chiefly occupied with eating and sleeping, that it may grow and develop. Although milk contains all the materials necessary for the nourishment of the infant, as it becomes more fully developed and begins to acquire strength, it requires food in greater variety and in a more solid form. It is then that the temporary or milk teeth appear, which is a critical period in the infant's life, owing to the nervous irritation produced on the system. The eruption of the temporary teeth commences about the seventh month and is complete about the

end of the second year, when the infant has so far developed, increased in muscular strength, and bones become so firm, that it can walk without assistance. The nervous system gradually becomes developed, as the senses are actively occupied with surrounding objects, and the infant learns to understand and speak articulate language.

The reasoning faculties are slow to develop, and the infant as it develops into a child, and even while passing through the period of childhood, is guided in its actions by instinct and impulses rather than reason, which it does not acquire until the entire development of the nervous system is complete.

The muscular system and bony skeleton develop progressively, and about the seventh year the permanent set of teeth begin to appear. The period of childhood is followed by that of youth, which is manifested by the change of voice and growth of beard in the male, and certain changes in the female. The development of the body is now nearly complete, and in a few years more the individual who has passed successfully through the different stages of preparation and growth, arrives at maturity, the fully developed adult condition.

XVI.—MAN FULLY DEVELOPED AND COMPLETE.

The fully developed man who enjoys perfect health is "complete" as far as his anatomical structure is concerned. In his origin he is weak, naked and defenceless, and his body no sooner arrives at maturity than it begins to decline.

The anatomical structure of man is peculiarly adapted to his well-being during his period of existence. None of his bones, muscles, organs or tissues could be improved either in their composition, adaptation to each other, or in their mode of action.

The hands of man are remarkable for the perfection of their structure. They are not only machines of matchless capabilities, but are instruments of sense—the finger-nails supporting the organs of touch without interfering with the delicacy of their perception.

The foot of man is admirably constructed both for maintaining the body in the erect posture and progression. The sole is broadly expanded to support the leg placed vertically above it, and the heel is cushioned beneath so as to bear the whole weight of the body without inconvenience.

As man is provided with two hands for prehension, and two feet for walking, he is called *bi-manous* and *bi-ped.*

Man alone of all mamiferous races has conferred upon him the power of articulating sounds,—communicating with his fellows by a mode of all others the most convenient. The superiority of the condition of man over animals is also shown in the faculty he has acquired of recording by written characters the result of his experience.

Man has not only obtained dominion over all animate creation, but the elements are made to serve his purpose, and he enjoys the ability of living in almost any part of the globe, in either extreme of natural temperature. The African negro thrives under the equator, and the Greenlanders and Esquimaux have reached between 70° and 80° of north latitude; but even Americans and Europeans accustomed to a temperate climate can adapt themselves to inhabit either of these extremes of heat and cold. Man can also subsist on the most varied food. In the northern regions the Esquimaux subsist on animal food and fish; we enjoy a carefully mixed diet; and the inhabitants of the torrid zone live chiefly on fruits and vegetables. Probably in each case that food which is most universally consumed is that which is best adapted for the health of the inhabitants.

Scarcely has the human body acquired its full stature and extended to its proper dimensions, before it begins to increase in bulk and decline; still it is frequently several years after the development of the anatomical structure is completed, before any particular disorder or affliction is perceived. The waste and decay although gradually progressing, is at first so slight that it is not observed.

Fat accumulates in the cellular tissue, and frequently increases in such quantity that it inflates the body, loads it with useless weight, interrupts the activity of the muscles, and requires greater exertion than formerly to perform the actions of life. The increase in bulk is therefore at the expense of ease, activity and strength. This is one of the first symptoms of the decline of life, and the following, taken from Zell's Encyclopedia, will give the reader a clear, correct, and concise description of man with his life failing, and death approaching:

"In proportion as we advance in years, the bones, the cartilages, the membranes, the flesh, the skin, and every fibre of the body, becomes more solid, hard, and dry: every part skrinks, every motion becomes more slow, the circulation of the fluids is performed with less freedom, perspiration diminishes, the secretions alter, the digestion becomes slow and laborious, and the

juices no longer serving to convey their accustomed nutriment, those parts may be said to live no longer when the circulation ceases. Thus the body dies by little and little; all its functions are weakened by degrees; life is driven from one part of the frame to another; universal rigidity prevails; and death at last closes the scene. When the natural stamina are good, life may perhaps be prolonged for a few years by moderating the passions, by temperance, and by abstemiousness; but no human art can prolong the period of life to any considerable extent. It is apparent, indeed, that the duration of life has no absolute dependence either on manners, customs, or the qualities of particular food; much, it is true, is to be ascribed to the quality of the air; but we may rely upon it that, if luxury and temperance be excepted, nothing can alter those laws of mechanism which regulate the number of our years. Well may it be said that man is a compound being — the link between spiritual and animal existence; partaking of both their natures, but having also something peculiar to himself. His intellectual faculties prove his alliance to a superior class of beings; his sensual appetites and passions show his affinity to the brute creation. A question involving both great interests, and difficult of solution, is that of the history of Primeval Man."

PART II.

MEN AND WOMEN:

HOW TO SUPPLY THEIR WANTS AND DIRECT THEIR POWERS.

INTRODUCTION.

EVERY man and woman should know how to supply the wants and direct the powers of his or her own body. Nothing on earth is more important to us, and perhaps nothing upon which there is a greater diversity of opinion, and nothing upon which more carelessness and ignorance prevail.

If all of the actual physical wants of men and women were regularly and completely supplied, and their powers intelligently and properly directed, their vital, natural and animal functions would be performed easily and perfectly, and there would be far less disease, physical pain and mental suffering in the world than there is to-day.

There is scarcely any earthly blessing that the great mass of people think so little of, and are more careless with, than the health of their own bodies; but if deprived of health they deeply regret its loss, and bitterly complain and reproach themselves for their indiscretions.

The structures and functions of the body have certain relations to each other, and to external agents, which are most conducive to their well-being and permanency, and a deviation from the

natural and healthy actions of the body, or of any individual part, constitutes disease. To prevent disease, preserve health, and prolong life, are the objects to be obtained in supplying our wants and directing our powers; and it is necessary in accomplishing these ends that we should understand the nature of our existence. The moment we attempt to penetrate a subject, however, we learn that it has depths which we cannot fathom. The known is a sign of the infinite unknown. In everything, from a grain of sand to the stars, we find mysteries before which the knowledge of the wisest shrinks into nothingness. All that we can do, therefore, is to do the best that we can with the facts in our possession.

I.—WHAT IS LIFE?

Life, in the general acceptation of the term, does not precede birth, but is the time between birth and death, in which the body and soul are united; but properly speaking, life commences with the first production of the germ, and is that state or condition of a being that exhibits vital actions. It is manifested in the phenomena of growth, development and reproduction, and terminates in the death of the organized structure, when its component parts are separated and the structure disorganized by the operation of the common laws of matter. Life is therefore the sum of the actions of an organized being.

Different Kinds of Force. Vital force or life force is a term used to designate that agency in organized bodies which gives them the character of living beings, and nerve force is a term used only to designate the force generated, accumulated, and reflected, by a ganglion or nerve centre, and transmitted by nerves. Force is any cause which is capable of producing motion in matter, or of stopping or altering its direction when produced. Every particle of matter in creation is

under the influence of several forces, and upon which it acts in return. Forces common to all nature, as heat, light, electricity, chemical attraction and gravitation, are called cosmic forces, and they have importance in the various functions of the body, and are transformed by vital process.

The action of each particular organ in the human body is dependent upon agents external to it for the excitation of its properties. Life force and nerve force are dependent upon heat, light, etc., for their sustenance; and all living beings introduce into their own structure alimentary substances derived from external sources, and it is necessary that we should breathe and submit the blood of our bodies to the influence of the element which we inhabit.

When the particular stimulus required by the various organs of the body is withdrawn, vital action ceases.

Correlation and Convertibility of the Forces. The doctrine of the correlation and convertibility of the forces of nature is very interesting, and a knowledge of it is exceedingly important and indispensable in supplying the wants and directing the powers of the human body. All forces of nature are convertible; assuming either as the cause, one of the other will be the effect. Heat will produce electricity, and electricity heat; magnetism will also produce electricity, and electricity mag-

netism, etc., etc. Heat, light, electricity, vital force, nerve force, etc., are but different modes of motion, and are all mutually convertible.

No force is ever annihilated. A definite quantity of any one form will produce a definite quantity of another. When an organized structure dies it is converted into its original chemical elements, or into something that represents them. If a stick of wood is burned, its condition is merely changed. It is converted into a definite quantity of heat, smoke, gases, watery vapor and ashes, which exactly represent the stick of wood, and may assist in forming other structures.

When a human being dies the body is converted into its original chemical elements or into something that represents them, as for instance the vegetable productions of the earth ; these clear away from the earth the elements of the decomposing body, and decompose, and assimilate them for their own increase.

The human or an animal body may decay after death on the surface of the earth, and the gases thus generated will be absorbed by the leaves of plants; or the decaying body may be buried deep in the soil, and even though out of the absorbent reach of the roots of plants and trees, the rain finds an easy passage through the soil, and trickles upon the decaying body, and from thence percolates with portions of the body to the water

courses in the valley below: it may nourish vegetable productions in its passage, or may enter into the formation of living objects in the valley. It may be said that there is no such thing as destruction of life in nature; that there is only continual changes in its distribution.

Man feeds on the lower animals and vegetable productions which in due time become a part of himself. The lower animals feed upon grasses and herbs which, in their turn, become the animal, then by its death, again pass into the atmosphere and are ready once more to be assimilated by plants. This cycle of changes has been going on ever since the earth has been formed and inhabited; and it is not difficult to prove that the elements of the living bodies of the present generation have passed through millions of mutations, and formed parts of all kinds of animal and vegetable bodies, and consequently it may be said that fractions of the elements of our ancestors form portions of ourselves.

The human body, therefore, is not annihilated by death, but its condition is merely changed. The vital principle, the intellectual, spiritual part, known as the soul, is separated from it; there is no vital force or nerve force remaining in the previously living structure, and it is in that condition in which waste and decay are not compensated for by repair. As none of the forces of

nature are ever annihilated, but are correlated to and persist in each other, it is clear that during man's existence upon earth his animating power or part, his soul, is correlated to all the other forces of his body and that the Creator himself is correlated to his entire creation.

The ancient Egyptians recognizing the convertibility of the forces of nature, believed that after death men's souls passed into other bodies of this or that kind, according to the life they had led; and the system of Brahmanism and Buddhism represent the soul as passing after death into the body of a higher or lower animal as a reward of virtue or a penalty for vice. Human life being regarded by these ancients only as a link in a chain of conditions through which the soul passes in a long career of procession from God and return to him; it is perhaps unnecessary to add that this theory is founded upon mere supposition.

There is no evidence of the pre-existence of a soul before its appearance in man, but there is undoubted evidence of the pre-existence of the elements which form his body. It is a well-known and established fact, that after the vital principle leaves the human body, the matter of which the body is composed, enters into the formation of other structures; but what becomes of the intellectual part, the soul, we know nothing other than that taught us by the inspired writings.

II.—WHAT IS HEALTH?

Perfect health is enjoyed by but few persons, therefore health is spoken of as implying merely a freedom from actual disease.

When a man possesses no hereditary taint, has a well-proportioned body, calm and regular circulation of the blood, free and full respiration, easy digestion, and all his organs and functions are in a condition to enable him to bear the "wear and tear of life," he is called a normal man.

Although health is defined as "that state in which all the functions of the body are performed with regularity and harmony," an individual may also be in health when certain functions are not performed; as, for instance, when a man is blind.

The standard of health is not the same in every individual. There is a vast difference in men's muscular strength and activity, nervous sensibility and sensorial powers, yet all within the limits of health, for that is health in some which would be disease in others.

Perfect health, which, theoretically, may be attained, is impaired by the influences of the hereditary

impress received before birth, the neglect of sanitary laws, the friction we undergo in our passage through life, and the toil and anxiety associated with existence. The influences imparted by parents to their children may to a certain extent become neutralized or modified by appropriate training and education, still they will ever take a prominent part in the formation of individual quality and character. It is necessary in the preservation of health to be temperate in all things, but especially in eating, drinking, sleeping and exercise; but before health can be preserved, it must be attained, and it cannot be attained, even though other conditions are favorable, unless the height and weight of the body are normal.

Man's Stature and Weight. — Their Relation to Health. The height of a human being is seldom less than five feet, and rarely more than six; females are a little shorter than males. As a rule, one fourth the height is reached at birth, one half at two and a half years, three fourths at ten years, and the full height of the human being is reached at the eighteenth year.

Individuals of medium height usually enjoy better health and have a prospect of longer life than either very tall or very short persons; but to fix the limits at which height and health are incompatible, would be difficult. Short persons, however, have a better prospect of health and long life than

very tall ones, from the fact that the vital organs do not keep pace in development with the muscles and bones of individuals exceeding the medium height.

The weight of a healthy man depends upon his height and age. A man thirty years of age, five feet one inch in height, who is enjoying good health, weighs about one hundred and sixteen pounds; if his stature should be five feet six inches, he would weigh about one hundred and forty-five pounds; but if he should happen to be a six-footer, his weight would be about one hundred and seventy-eight pounds. The increase in weight per inch of stature above five feet is usually between five and six pounds.

There are variations in the above figures dependent upon race, employment, habits of life, etc., which must be taken into consideration in estimating the standard of health; but when the variations are very great, they are usually due to some disease lurking in the system.

A diminution of weight far below the standard would indicate impaired nutrition, and an abnormal elevation of weight, when manhood is established, may imply a tendency to fatty degeneration or apoplectic affections. A sudden change of weight, especially a rapid reduction, demands more careful attention than an habitual departure from the normal standard. It may be caused by some

morbid taint that induces wasting, as consumption.

Normally, there is a progressive increase in the weight of an individual from birth to the decline of life. It is not identical with development, for the full growth of the body reaches its acme in the third decennium of life, and the increase in weight after that period, is due to the accumulation of fat in various parts of the body. Frequently it accumulates in such quantities that it becomes oppressive, uncomfortable, and a serious hindrance to life's activities. It is then a diseased condition called *obesity*. This condition is especially noticeable in a corpulent, helpless old lager-beer drinker, who is a sort of living corpse, so to speak — sickly, wretched, and repulsive.

In some individuals the tendency to an excess of adipose tissue or fat is hereditary. The cause is some peculiarity of the organism, such as a disproportion between the lung capacity and fat-forming process, which interfers with the proper oxidation of ingested material.

Much has been written on the best method of preventing and removing obesity, and the conclusions of most writers are, that the excessive fat can be reduced by abstaining from all kinds of farinaceous food, sugar and fat; but much injury may arise by the adoption of a disciplinary diet, especially when the fat is rapidly reduced in

those who are hereditarily predisposed to it. In reducing the weight, therefore, it is best to be under the observation of a competent physician. Patients who take medicines to remove obesity, and at the same time eat heartily of all kinds of food, derive but little benefit, and oftentimes much harm from the medicine. (See Adipose Tissue of Fat.)

Duration of Life. The length of a man's life depends greatly upon the man himself. Of course he cannot prolong his life beyond a certain limit, but he can shorten it, and whether he lives one quarter, one half, or the full time allotted to man, depends principally upon the care he takes of his own body.

Death ought to be a gradual cessation of the functions and phenomena of life — the result of old age — without pain and suffering, instead of the violent, unnatural termination of existence from disease, as is often the case. With certain conditions of comfort, moderation, freedom from care, regularity of habits and observance of the rules of hygiene, the majority of men would live their full threescore years and ten; and if they have inherited a good constitution from their progenitors, may possibly attain the age of one hundred.

As we advance in life we note the survival of many of our acquaintances who seemed in boy-

hood and youth quite the reverse of "the fittest," while many of those envied in early life for their robust health and vigor, are dead. This is due to several causes. The man of powerful physique and excellent health may violate the laws of physical existence every day, and only when a long series of follies begin to tell on his constitution, will he comprehend that he has been drawing bills on health to be repaid at ninety per cent. after thirty, or perhaps sooner. It is difficult to convince such a man in his younger days, that in seeking pleasure he is constantly committing excesses which will shorten his life; that his ambition causes him to overtax his brain, nervous system and muscular powers, and that all the actions and functions of his mind and body should be regulated and properly directed. Although considered a man of sense and prudence, he indulges in those things which experience proves to be unsuited for him, and he does not think of the old saying, that "A wise man governs his passions, but a fool permits his passions to govern him;" and in a few years his vitality is gone, and his life is prematurely cut off.

On the other hand there are men who, although they have constitutions flawless in point of organic disease, lack physical force. When compelled to labor excessively, mentally or physically, they are quick to feel fatigue, and soon fail from exhaus-

tion. Their grand safeguard is inability to abuse their powers. Nature has in their case imposed checks too stern to be disregarded, and such persons cannot extend their hours of intellectual work without pains in the head which positively prohibit it. If they drink whiskey beyond moderation, intolerable sickness at the stomach is the penalty, and they vomit the spirits out again. They have to be careful whether they want to or not, and by compulsorily husbanding their resources they often reach eighty, ninety, or one hundred years of age, during which time, although working moderately, they often accomplish a vast and astonishing amount of work. Therefore it often appears that the extraordinary strength and good health of some men is a misfortune, and the lack of physical force in others is a blessing.

Some persons appear older at fifty than others do at sixty or seventy; and occasionally a man who has reached his hundredth year appears no older than one of eighty. The difference in their appearance and age is owing to the qualities they have inherited, and their mode of life.

The antediluvians attained an extraordinary age. Methuselah who lived the longest, was 969 years old when he died. Noah was 500 years old when Shem, Ham and Japheth were born; and some of his descendants exceeded what are now considered the ordinary limits of human existence;

still, no one born after the Deluge passed the age of 464 years, or one half of that attained by some of the antediluvians. Terah, the last who exceeded 200, died B. C. 1921, and since his time but few instances are recorded of men living beyond the term mentioned in the Scripture as the ordinary limit of human existence. Buffon, a French writer, has offered the following as an explanation why the antediluvians attained such a great age: "Before the Flood the earth was less solid, less compact than it is now. The law of gravitation had acted for only a little time; the productions of the globe had less consistency, and the body of man, being more supple, was more susceptible of extension. Being able to grow for a longer time, it should, in consequence, live for a longer time than now."

The German Heusler has suggested on the same point, that the ancients did not divide time as we do. Previous to the age of Abraham, the year, among some people of the East, was only three months, or a season; so that they had a year of spring, one of summer, one of fall, and one of winter. The year was extended so as to consist of eight months after Abraham and twelve months after Joseph.

The following, which has lately appeared in several newspapers, credited to "Popular Science," throws additional light on the subject:

"On a full examination of the question of patriarchal longevity, the disparity of their ages to those of later times disappears. A very slight error in the translation of the Hebrew numbers has led to all this apparent disparity. The age of the antediluvians was not to exceed 120 years. Genesis vi., 3: 'And the Lord said, My Spirit shall not always strive with man, for that he also is flesh: yet his days shall be an hundred and twenty years.' This was the regular good old age of men, with special variations, both before and some time after the days of Abraham.

"In reading concrete numbers, the Hebrews gave the large number first; thus: ninety and seven for 97; forty and seven for 47. The reversal of this rule in the translation of Genesis v., 3–5, as an illustration, will show the error in all similar cases. 'Adam lived an hundred and thirty years and begat a son,' etc. This is correct, according to the rule. Seth was born when Adam was 130 years old, and was his last child. But if the rule were here reversed, as it is in the authorized version, in the fifth verse, it would read thus: Adam lived 3000 years, and begat a son! This shocked the consciousness of the Christian translator, and he was driven to the true rule of the Hebrew uses in case of concrete numerals.

"In the fifth verse we have the force of the violated rule, thus: 'And all the days that Adam

lived were nine hundred and thirty years: and he died!' A. V. The true reading of the rule would be, 'And all the days of Adam which he lived, were a hundred years, and thirty and nine years: and he died;' making the entire age of Adam 139 years, instead of 930 years.

"It will be seen on examination, that concrete numeral adjectives in Hebrew, as in other languages, agree in number with their nouns. In the case cited in the A. V., the nine is made to agree with hundred in the singular, and not with years in the plural. The error is seen at a glance, for the difference between "nine years" and "nine hundred years" is too great to be overlooked in any careful translation of a sacred book. The translator assumed that nine here agreed with the hundred when it had no such agreement; hundred in the text is itself a concrete numeral, and separately agrees with years, meaning of a hundred years; at the date of this writing "nine hundred," or any number of hundreds above one, without repetition or circumlocution, there were none of the Masoretic points in use. In the case of the age of Terah, the father of Abraham, the translators have made the attempt to make two hundred out of one hundred in the word mathim, used in the plural, as it might be to agree with years, thus making Terah 205 instead of 105 years old at his

death; holding the theory that the word mae (or one hundred in the plural, mathim) makes twenty. This is contrary to all rule. The Hebrews could by pluralizing a numeral less than ten, add tenfold to the unit; thus: hemosh, five, hemoshim, fifty. This rule, applied in the case of Terah, would make him ten times 105 years old, or 1050 years old. In the case of Terah the historic record conclusively contradicts the translation, and hence demonstrates the rule that pluralizing one hundred does not in the Hebrew tongue make two hundred, while as to the numerals between two and ten, the rule might apply; thus: Shelesh, three, sheleshim, thirty, and in a like manner to ten. With these corrections, refering to the ages of the patriarchs before the Noachian Deluge, the article of M. de Solaville would show a wonderful uniformity in the age of man since the dawn of history.

"From Adam to the Flood the ages would read as in the table below, subject to a few uncertainties in the numbers below 100, as the numerals are sometimes pluralized for purposes of agreement when they were not increased tenfold. The cases are not always certain; the table to the Flood is substantially true. The table is added, giving the ages of each at the time of his death:

1. Adam, 130 years, and not 930 years.
2. Seth, 121 years, and not 912 years.

3. Enos, 114 years, and not 835 years.
4. Cain, 119 years, and not 910 years.
5. Mahalaleel, 122 years, and not 825 years.
6. Jared, 117 years, and not 962 years.
7. Enoch, 114 years, and not 365 years.
8. Methuselah, 124 years, and not 966 years.
9. Lamech, 117 years, and not 777 years.
10. Noah, 159 years, and not 950 years.

Average 120 plus years."

There is every reason to believe that in proportion as the laws that effect health are understood and acted upon, the duration of life will be increased, and healthier parents will give birth to healthier children from generation to generation.

III. — HOW TO SUSTAIN LIFE AND PRESERVE HEALTH.

To sustain the life and preserve the health of the human body, certain external agents are necessary. A healthy man apparently remains the same from day to day, and presents the same unaltered aspect of form and size for a long period of time; still he is undergoing an incessant change. The various parts of his body are wasting away every day, every hour, and every moment, but the structure appears the same because the tissues and fluids are reproduced by means of certain external agents, and when these agents are withdrawn, health is destroyed and life ceases.

The food and drink consumed by man, heat, light, atmospheric air, etc., are agents by means of which his health is preserved and life sustained; but out of about sixty elementary bodies only a small proportion enters into the composition of man and are required to be present in his food and drink. Those absolutely necessary are carbon, oxygen, hydrogen, nitrogen, sulphur, chlorine, phosphorous, sodium, potassium, calcium, magnesium, iron and fluorine; but these simple bodies must

be in combination before they are capable of being assimilated and converted into tissue, and their assimilation depends upon certain chemical decompositions and physiological processes. There is a difference in the number of elementary substances in combination. Water, for instance, contains two elements; oxygen and hydrogen. Sugar, starch, fat, etc., each contains three elements. Caseine of milk contains five elements, and albumen and fibrine each contains six elements, etc.

In infancy, childhood and youth, the reception of matter exceeds the loss, and the body steadily increases in weight; but in old age reparation does not keep pace with decay, and the bodily weight steadily declines. In the intervening period of adult life there is a state of equilibrium; the various ingredients of the body are destroyed and renewed with but little variation.

The demands of the body for matter from without at all periods of life are pressing and momentous. If oxygen is withdrawn for but a few moments from the air inhaled, suffocation and death quickly follow. If food and drink containing the elements necessary to sustain life are withheld, indescribable agonies ensue, the waste and decay of the body are not repaired, and life becomes extinct.

Hunger and thirst proclaim that more nourishment is required for bodily support, and the

irresistible demand cannot be put off unless at the expense of health and life. Animal and vegetable food, together with vegetable gluten, contain albumen, fibrine and caseine, which furnish the body with oxygen, hydrogen, nitrogen and carbon. Meat, eggs, milk, corn, and various vegetable productions, contain one or more of these principles. Food containing sugar, starch, or organic acids, introduce carbon, hydrogen and oxygen into the system. Fatty foods, nuts, etc., contain carbon with a little oxygen and nitrogen.

The body is supplied with phosphorous when animal flesh, fish, oysters, etc., are consumed, and it also receives it in the shape of phosphates, which exist in the juices of many edible vegetables. Iron, sulphur, chlorine and sodium are introduced into the system in combination with various foods; but the two latter in the shape of chloride of sodium (common salt), is used to flavor nearly all kinds of food. Potassium and calcium are found in various kinds of animal and vegetable food; the latter is also obtained from drinking water, which usually contains sulphate and carbonate of lime in solution. Magnesium is usually found with calcium, and traces of fluorine exists in blood, milk, etc. The bulk of the human body and of the food we eat is composed of carbon, hydrogen, oxygen and nitrogen;

but as already stated, all of the elements mentioned are essential to health and life.

Should man be deprived of either one of the substances necessary to nutrition, he would die; for the other ingredients of the food, although proper, are not sufficient by themselves. Medical men, in the interest of science, have tried the experiment of depriving themselves of one particular necessary ingredient of food, and found that although they consumed the other substances with relish for a time, the deficiency soon became manifest in the intense craving for the missing ingredient. They became feeble, emaciated, and would have died of imperfect nutrition, had the experiment not been stopped. Therefore, experience, physiology, and our natural appetites, show that man must have a mixed diet; that all the substances necessary to life must be combined, or our food and drink will not be capable of preserving health and sustaining life.

Pure Air — Its Necessity. Of all the wants of the human body, none are so constant and pressing as that of air. The demands for food and drink may be met by occasional supplies, but air must be furnished every moment, or life will become extinct. If we desire physical strength and energy, it is as important that the air we breathe should be pure, as it is necessary that the food we eat should be wholesome. How

air sustains life has been explained under the head of Respiration.

Air, or the atmosphere, is a mixture of oxygen and nitrogen, in the general proportion of four fifths by weight of the latter, to one fifth of the former; but it also contains a small quantity of carbonic acid and watery vapor, which varies with the locality and weather, and which are considered as accidental ingredients, and not constituent parts.

Oxygen is absolutely indispensable to existence, but nitrogen neither supports nor destroys life; it dilutes the oxygen, and thus makes it especially adapted to our existence and well being. If we should be confined in a room where there is less oxygen than that naturally contained in the air, there is a depression of mind and body corresponding with the deficiency; on the other hand, if the natural quantity of oxygen be increased, there is unusual activity of all the bodily functions; the life forces are exalted, and the vital operations are driven at a preternatural speed. If pure oxygen is respired, life would be excited to such a high degree that we would rush through its feverish course in a very short time.

Carbonic acid when inhaled is very destructive to animal life, but it is the great source of nourishment to vegetable life. Animals would

soon exhaust the oxygen in the air, and supply its place with carbonic acid and die, were it not for plants; they absorb the carbonic acid from the atmosphere under the influence of sunlight, and replace it with oxygen through innumerable pores in their leaves; thus the proportion of carbonic acid in the atmosphere is kept down to the point of safety for animals.

The respiration of animals is not the only source of carbonic acid. The great sources of it are, the combustion of burning bodies, fermentation and decay, and it is poured into the air in vast quantities from volcanoes, springs, etc. When it is set free too rapidly to become diffused through the atmosphere, it causes suffocation and death to all who inhale it. Frequently it accumulates in mines, cellars, rooms, wells, etc.; and as it extinguishes flame and suffocates animals, miners call it "choke damp."

The atmosphere surrounds our globe and revolves with it, and extends from forty to fifty miles from the earth's surface. It has a blue tinge in large masses. The distant hills appear blue because seen through several miles of air, and the sky appears of the same color from the same cause.

The atmosphere becomes contaminated with substances detrimental to health and fatal to existence in many different ways. It is the reservoir into which all volatile matters escape; and the

decay of animal and vegetable matter generates numerous substances which impair health and create disease; minute microscopic disease germs not only float about in the atmosphere, but frequently are carried long distances with the wind. Prolific sources of disease are the exhalations and effluvia arising from active decomposition in wet lands, marshes, swamps, sewers, cess-pools, etc.

Noxious exhalations when set free, fortunately, are diffused through the vast volume of the atmosphere. The law of gaseous diffusion, aided by winds and storms, secures dispersion and universal intermixture, and the proportion of impurities in the air we breathe, is thus rendered so small that their effect usually is not perceptible; and besides, the oxygen of the air destroys and purifies the poisonous emanations. The atmosphere, therefore, purifies itself by its own action; but the air in rooms, dwellings, public buildings, and all confined places where there is a limited supply, cannot purify itself without assistance from external sources. Air to be pure and healthy, requires continual circulation.

Night air is less healthful than that of the day, because during the daytime, under the influence of the sun, the air near the earth expands and rises in an upward current, diluting and carrying away with it the impurities from the earth as fast as they are set free; but at night, as

there is no solar heat to lift and disperse the seeds of pestilence, they accumulate and condense near the earth. Therefore those exposed to the contaminating influence of night air out doors, and those who sleep on the first floor of a house, three or four feet from the ground, where they are directly exposed to terrestrial exhalations, are much more liable to disease than those who remain indoors at night and sleep in apartments on the second or third floor. During the prevalence of a certain disease in a prominent city, those occupying rooms on the upper floor of the house were rarely afflicted, while those on the ground floor were the victims.

The oxygen is soon exhausted from the air of occupied rooms by breathing, the burning of fuel, combustion for light, etc.; and unless the supply is renewed, there is general depression of the vital powers of persons within the apartments, which soon terminates in their death.

The occupants of an unventilated room usually do not recognize the poisonous qualities of the air they inhale, for their effects are of that stupefying nature that makes people insensible to them; but a person entering from the pure air outdoors, quickly perceives the impurities of the foul air by their sickening and disgusting odor. This is especially noticeable when from the pure air we enter an unventilated bedroom in the

morning, where one or two have slept the night before.

Impure air is more apt to create disease than improper food. When air is inhaled it passes directly into the blood, and its impurities exert their injurious effects at once; but as food must undergo a long process of preparation, during which its noxious ingredients may be rejected from the system as unfit material, it is less likely to do harm than bad air.

Impure air not only engenders disease, but its immediate effect is to cloud and depress the mind so that it has not its usual clearness, shrewdness, and energy. Reason loses its keenness of penetration, and the judgment its acuteness of discernment, and we can neither study nor remember so well, nor understand so clearly, as when the air we breathe is pure. We get impatient and irritable, and sometimes instead of seeking relief by exercising in the pure and fresh out-door atmosphere, foolishly resort to artificial exhilarants and stimulants.

We should endeavor to have the freshest and purest air attainable in our rooms; pure air in a sick room is one of the cheapest and best medicines; but when removing foul air from apartments and introducing pure air, care must be taken to guard against injurious draughts.

Exercise and Recreation. Exercise and recrea-

tion are essential to health, and in supplying the wants and avoiding the afflictions of the human body, they demand special consideration.

Moderate exercise in the open air assists the various secretions of the body and develops the physical organism; but to be beneficial to health, it should be a pleasure and not a disagreeable, hard, mechanical routine.

Exercise to promote health must be carried on in the open air and sunlight. Gymnastics, billiards, ten-pins, or any form of indoor exercise, are not, as a rule, conducive to health, for they are usually associated with impure air. A quiet life in the pure open air is more healthful than an active life under cover.

Exercise although essential to health, is detrimental to health when very violent, too long continued, or exhausting. Moderation, and not excess, prolongs life. We should not strive to see to how great an extent we can abuse our powers without permanent injury, but should endeavor to direct them so as to secure our well-being and pleasurable existence. Boat-racing, walking matches, etc., are not usually conducive to health, as the exercise is too excessive; and the accompanying excitement and exhaustion may do much harm.

Mere brute force does not imply health. A man may have his muscles enormously developed, he may be the champion oarsman, an expert gymnast,

or the hero of a prize-fight, and yet have a weak, nervous system, and be utterly incapable of protracted study or thought. A man celebrated for his great muscular strength and powerful physique, usually is not a man of very great intellectual attainments; and some of the worst cases of nervous exhaustion are frequently found in men of large frames and powerful muscles. Great strength, however, is not incompatible with health, but men possessing it are apt to abuse their powers.

The degree of exercise best adapted to supply the wants of each individual varies with their age, conditions and habits; and of the different kinds of exercise, that usually is most healthful which is most congenial to the taste; but no exercise should be continued beyond slight fatigue; never to complete exhaustion, or the body will become debilitated instead of invigorated.

Moderate exercise increases the appetite and strength, makes the blood flow more freely, promotes respiration and nutrition, and assists the preparation and maintenance of animal heat. Neglect of out-door exercise by persons of sedentary habits induces dyspepsia, impairs nutrition, causes muscular weakness, nervous irritability, and mental dullness. These evil results accumulate gradually but surely.

The strongest muscles of the body are those used the most, and the weakest are those used

the least. The size and strength which the muscles gain by exercise can be preserved only by its continuance. Muscles permitted to remain inactive soon lose their fullness and power, and become soft and feeble.

Sleep — Its Necessity. Sleep is a natural state of unconsciousness which alternates with a period of activity; or in other words, it is a repose of the organs of sense, intellectual faculties and voluntary motion. The involuntary functions, however, go on as when awake; the chest moves, we breathe, the heart beats, the blood circulates and is purified, and the system is nourished.

Every act that we perform, every movement that we make, every thought that passes through our minds, every emotion that stirs our souls, produces a waste of tissue; and as the process of repair is carried on only during sleep, we must have it, or we suffer speedy dissolution.

As sleep approaches, the activity of the mind is diminished and the power of attention lost. The senses become blunted to external impressions, our ideas get confused, and we feel an intense desire for quiet and rest. Our muscles become relaxed, and we instinctively assume an easy position. The first sense lost in sleep is sight, then follows the sense of taste, smell, hearing, and finally the sense of touch, the most persistent of the senses, disappears. Sleep is at first deep, then soft and

gentle, and becomes gradually less sound as the time for waking approaches, when usually there is an intermediate state between sleeping and waking, in which sleep is very light.

Sleep is nature's restorer of exhausted power; and though we retire wearied, we awake refreshed; the muscles then possess greater strength, the nerves have attained a higher sensibility, and the powers of the mind are more active. A person is most easily awakened by the sense of touch; next by sounds, then by smell, and finally by light.

The number of hours' sleep that a person requires depends upon the age, health, temperament, habit, previous fatigue, and climate. There are so many circumstances to be taken into consideration, that no precise rule can properly guide all; but it may be said that fully developed men and women usually need from seven to nine hours' sleep out of every twenty-four. In general, one should sleep until he naturally awakes. Infants and very old persons require a great deal of sleep, and middle life is the period when the system requires the least. Men usually require more sleep than women.

Whatever may be the time that an individual requires for the recovering of exhausted power by sleeping, that time cannot be shortened without impairing more or less the strength and activity

of the next day. The body has less energy for action, and feels less refreshed when we have less sleep than we require.

We all occasionally devote a night, or part of a night, to either travel, labor, business, pleasure, attending the sick, etc., and none of us escape the penalties that always follow the violation of the law of rest.

The alternations of day and night afford a time for activity and a time for rest, and if we wish the most perfect sleep and refreshing rest, that which most recuperates the system, it must be obtained at night when all nature reposes.

Sleep during the daytime does not fully compensate for the loss of night sleep, and, as a rule, it is best for the health to retire at night so as to have at least two hours' sleep before midnight: or, in other words, those who habitually retire at ten o'clock enjoy better health than those who "keep late hours." The difference in the appearance of a person who habitually retires early, and that of one who retires late, is well known.

The position we occupy during sleep influences its strengthening and refreshening power. Sleep may occur in the sitting posture, and has occurred while standing, walking, and riding horseback, among exhausted soldiers and others; but the recumbent position is the best in which to sleep. Usually it is best to sleep in whatever position

is most comfortable; but we should not get in the habit of sleeping in one position only; we should alternate and sleep occasionally on either side. The right side is better than the left to lie upon for any length of time, as usually it does not interfere with the action of any of the vital organs.

A young person should not sleep in the same bed with an old one, as the younger in such a case will lose vitality; and, as a general rule, it is more healthful for each person to occupy a bed alone.

Sleep is most refreshing when taken in a large, well-ventilated room. The bed should be neither too hard nor too soft; a very hard bed affords but few points of support for the body, and consequently less comfort is enjoyed than in a moderately soft one where the weight of the body presses on a larger surface; but when the bed is an exceedingly soft, downy one, it debilitates rather than strengthens the sleeper, as it allows the body to sink within it, and keeps up too great a heat. It is considered best for the health to have the head of the bed toward the north, as it puts the sleeper in harmony with the electrical currents caused by the motion of the earth on its axis.

Frequently people are unable to obtain the amount of sleep that they require; they may have

the time for sleep, but be troubled with persistent wakefulness. The absence of sleep, sleeplessness, or insomnia, as it is termed, is an indication of suffering in some organ, although the patient may experience no real pain. All exciting passions have a tendency to prevent sleep; and mental anxiety with doubt or uncertainty as to the result of some important action of life, will cause morbid wakefulness which, when persistent, is a prominent cause of lunacy. Sleeplessness not only forms one of the premonitory symptoms of insanity, but it is usually present in mania greatly aggravating the disease.

The length of time that a person may exist without sleep varies with different persons. In the restoration of the exhausted energies of both mind and body sleep is as necessary as food and drink; and the suffering caused by enforced wakefulness is equal to that experienced when deprived of water.

A Chinaman who murdered his wife in 1859, was sentenced to die by being deprived of sleep. He was placed under the care of a guard which was relieved every alternate hour, and was thus prevented from falling asleep night or day; and after living nineteen days without any repose he died. His sufferings were so intense that on the eighth day he implored the authorities to grant him the blessing of being strangulated, guillotined,

burned to death, drowned, garroted, shot, quartered, blown up with gunpowder, or put to death in any conceivable way which their humanity or ferocity could suggest.

Damiens, who was tortured in Paris, in 1757, for attempting to assassinate Louis XV., is said to have remarked just before he died, "that the deprivation of sleep had been the greatest of all his torments."

Five young men recently attempted, for a wager, to keep awake seven days. They prevented sleep for a time by drinking freely of strong coffee, and keeping up a constant round of active exercises and exciting amusements; but at the expiration of five days two of them were overcome by sleep, a third was compelled to retire by sickness, a fourth soon after fell asleep while riding horseback, and tumbled from the saddle, and the fifth held out to the seventh day, and won the wager, but lost twenty-five pounds of flesh.

When afflicted with unnatural wakefulness, the means used to procure repose must vary with the cause of the wakefulness and excitability. Sufferers from sleeplessness usually have a strong tendency of blood to the brain, with cold extremities; and the pressure of blood on the brain keeps it in a stimulated or wakeful state. During sleep the arterial circulation of the brain is at its minimum,

and when awake the use of remedies which diminish the quantity of blood in the brain are promotive of sleep. Sleep procured by medicine is rarely as beneficial as that secured naturally, for medicines frequently disturb the nervous system, and thus counteract to a certain extent the good results of sleep. People should not, therefore, take drugs to procure sleep without the advice of a physician.

The following suggestions will be found serviceable to persons afflicted with persistent wakefulness when they require sleep. Before seeking repose, sufficient muscular exercise should be taken to produce weariness, but not exhaustion; the mind should be as free as possible from care and anxiety; exciting reading, excessive brain work, and tea and coffee should be avoided in the latter part of the day; the food consumed should be digestible, and such as will not favor the production of flatulence or acidity; and the patient should retire to rest at an early, regular hour, in a clean, comfortable bed, in a large, quiet, well-ventilated room.

The sufferer from unnatural wakefulness may often be very sleepy before retiring to rest, but become wide awake after going to bed. He should then arise and try to withdraw the excessive amount of blood from the brain, by rubbing the body and extremities with a crash

towel, or flesh-brush, or in warm weather take a good bath, and sleep frequently will follow in a few minutes. A short, rapid walk in the open air, or going up and down-stairs a few times just before retiring, will aid in equalizing circulation and promoting sleep. A pillow containing fresh hops will often produce sleep when many other remedies fail.

Although, as a rule, it is not a good plan to sleep with high pillows, some persons troubled with sleeplessness find it best to recline with the head and shoulders slightly raised; and thus, by gravitation, the flow of blood to the head is retarded, and sleep promoted. For the same reason they frequently get into the "land of nod" while comfortably seated in an easy chair.

Recourse may be had to medicines if attention to these simple rules fail to produce the desired effect. When any physical cause for the wakefulness exists, it must of necessity be removed.

Different kinds of Food, and their Mode of Preparation. Food of all kinds has been divided into two classes: those substances which do contain nitrogen, and those which do not. The first class is called nitrogenous or albuminous, and is devoted to the production of blood, flesh, etc. The basis of animal tissue is nitrogen, and the muscles are identical in composition with the nitrogenous principles of food.

The second class, called non-nitrogenous substances, are fats, oils etc., and are largely used in cold countries to sustain the vital heat. They readily attract the oxygen inhaled, and seem devoted to simple combustion in the system with only the evolution of heat.

Food intended for eating should be carefully and properly prepared. It should be attractive, of the desired flavor, and nutritious; and the cooking should be managed so as to accomplish these ends. All of the nutritious juices of meat are soluble in cold water, therefore in the preparation of meat for food, by boiling, the water should be boiling hot when the meat is placed in it, so as to coagulate the albumen on the surface, thus forming a crust, which prevents the escape of the nutritious juices; but in making soup, the meat should be put in cold water and gradually raised to the boiling point.

In roasting and broiling meat, it should first be applied to a strong heat, so as to coagulate the albumen, and form a crust to retain the juices, as in boiling. The effect of heat applied to meat in boiling, roasting and broiling, is to coagulate the albumen in the muscular tissue, and soften and gelatinize the cellular tissue between the muscular fibres; the fibres are then more easily separated from each other, and the whole mass is thus rendered more tender and digestible. The heat

develops in the albuminous ingredients of the meat a peculiar and attractive flavor, which excites in a healthy manner the digestive secretions. Fried meat is not as wholesome as boiled, roasted, or broiled, as frying is performed with heated fat or oil, which is decomposed during the operation.

Salting, pickling, and smoking meat, hardens its texture, and renders it less palatable, less digestible, and less nutritious. Salting renders meat less nutritious, because a large quantity of albumen, soluble phosphates, lactic acid, potash, creatine and creatinine, are abstracted in the brine. Of all the different varieties of meat, beef is the most valuable, mutton and venison next, then the flesh of fowls, and lastly fish.

Pork is the principal meat of some families; but whether salt or fresh, it is slow to digest, and should be eaten only by those who have strong constitutions and work hard in the open air; and then should be eaten only when no other food can be obtained. It is nutritious, but it frequently contains a parasite called trichina, which may be transferred to the human system and cause disease, especially when the pork is not cooked thoroughly. The hog is the filthiest of animals, and those who eat its flesh do so at the risk of disease.

Vegetables are healthful and indispensable as food, for man requires a mixed diet: flesh, fish, vegetables and fruit. Vegetables and fruit are

rich in valuable saline substances which act as antiscorbutics (preventives of and remedies for scurvy), and are therefore essential to the system. They vary in their digestive and nutritive qualities according to the proportion of their constituents, and the way they are prepared for eating. Vegetables in their raw state are usually so hard as to be entirely indigestible, but cooking softens and disintegrates them and makes them more palatable. Most esculent vegetables abound in indigestible ligneous tissues which excite intestinal movement, and thus incline to produce aperient effect. Such vegetables as potatoes, beans, peas, turnips, etc., contain principally starch mingled with various proportions of albuminous matter, sugar, water, and mineral substances.

Potatoes contain a large proportion of starch, and when mealy are easy of digestion either boiled or baked. Beets, parsnips, carrots, etc., which contain a large proportion of sugar, are best cooked by steam, as boiling water dissolves a large quantity of their nutritious ingredients; most vegetables, however, are best boiled. Tomatoes are healthful, and are relished by most persons either raw or cooked, cold or hot. Their effect on the system is similar to that of fruit. Onions are not popular as food in fashionable society, as they have a peculiar volatile oil which is not assimilated or destroyed in the body, but escapes

through the lungs, contaminating the breath; still they possess many virtues. They are of especial benefit to nervous persons troubled with sleepless nights, and to persons afflicted with coughs and colds.

Fruits, although used for food, are prized not so much for their nourishing and strengthening power, as for their delicious and refreshing taste, which is caused by a combination of sweets and sours, sugars and acids. They are considered more as a luxury than as articles of food, and afford less nourishment than any other class of aliment. In green fruit the sour taste predominates, and although the quantity of acid increases as the fruit ripens, yet the sugar increases so much faster, that there is a gradual sweetening as the fruit matures and the acids become enveloped in sugar. In stewed fruit prepared for food, the sugar and vegetable jelly cover or mask the acids and salts, and thus check their irritating action upon the inner coating of the digestive passage. Fruits act on the system in the capacity of refrigerants, tonics, and antiseptics, and prolonged abstinence from fruits and succulent vegetables brings on a disease called scurvy, which has been very destructive to voyagers at sea, explorers of barren regions, and large armies.

Condiments — Their Effect on the System. Condiments are used for flavoring food and rendering

it palatable; but they serve other purposes besides ministering to the taste. Sugar, oil, acids and common salt have been described as aliments, but they are also employed as condiments. There are various kinds of condiments, but most of them, as pepper, mustard, horse-radish, and the various spices, possess stimulant properties.

Common salt is universally used as a condiment; it is a constant ingredient of the blood, and man could not live without it. It is naturally present in the food we consume, but not usually in sufficient quantity for the demands of the system; therefore we add it to most of the substances we eat. The desire for salt is instinctive, and indicates the natural craving of the system for something which is essential to its organization. Common salt by decomposition in the presence of water, yields an acid and an alkali — hydrochloric acid and soda; this separation is affected in the system, and is the chief source of the hydrochloric acid of stomach digestion. After salt performs its office in the system, it escapes by the kidneys, intestines, mucous, perspiration and tears. Abstinence from salt produces disease and death; and as the excessive use of salt produces the same result, we should use it only in such quantities as are proportioned to our actual wants.

Black pepper is more extensively used than any

other condiment excepting salt. When used in proper quantities it excites warmth in the throat and stomach, quickens the appetite and digestion, and tends to prevent flatulence from vegetable food. Black pepper, cayenne pepper, mustard and the various spices, owe their stimulant quality to the presence of a volatile oil.

The volatile oils of mustard, horse-radish, parsley, caraway, anise, fennel, water-cress, thyme, etc., stimulate the system, but do not incorporate themselves. Fluid mixtures of condiments are called sauces; but in whatever form condiments are used, their daily use injures the tone of the stomach after a time, and impairs the digestive function. The only exceptions are salt and vinegar.

Different Kinds of Drinks, and their Mode of Preparation. Drinks are liquids introduced into the alimentary canal, usually for the purpose of repairing the loss of the fluid parts of the body, which loss is indicated by thirst; but drinks are also used for the purpose of nutrition, as when beef tea, etc., are consumed, and for stimulation when alcoholic liquors are imbibed.

Drinks may be divided into the following seven classes, the first of which enters into the formation of each of the others: 1st. Water, a clear, colorless, tasteless, and inodorous liquid. 2d. Mucilaginous, farinaceous, or saccharine drinks, as flax-seed tea, etc., which are a little more nutritious than

water. 3d. Aromatic or astringent drinks, such as tea, coffee, chocolate, cocoa, etc. The last two contain oil and starch, and all of them contain principles which slightly exhilarate the nervous system. 4th. Acidulous drinks, such as lemonade, currant juice water, raspberry vinegar, etc. They allay thirst and form cooling and antiscorbutic drinks. 5th. Drinks containing gelatine and ozmazome, including broths, beef tea, soup, etc. These when properly made, ought to contain all the solvable constituents of the substances from which they are prepared. 6th. Emulsive or milky drinks, such as animal milk, cocoanut milk, almond milk, etc. Milk of animals contains the essential ingredients of food, and the others are slightly nutritive. 7th. Alcoholic and other intoxicating drinks, including beer, wines and spirits. When drinks of either of these seven classes are used for medical purposes, they are called medicinal drinks.

Water is the natural beverage of mankind; and pure water like pure air is essential to good health. It consists of eight parts by weight of oxygen to one of hydrogen, or one part by measure of oxygen to two of hydrogen.

Water, as found in nature, is never perfectly pure. It comes in contact with a great number of substances which it dissolves, so that it is always contaminated with foreign matter; and poluted water, like impure air, is one of the most

common sources of disease. The foreign substances or impurities which the water acquires communicate their properties to the liquid, and thus there are many varieties of natural water; as for instance, rain water, spring water, well water, river water, and sea water.

Rain water is the least contaminated of natural water; but it almost always contains carbonic acid, carbonate and nitrate of ammonia, and other constituents depending on the locality in which it falls. It absorbs and washes out of the atmosphere whatever impurities it may contain. The purest of rain water, the purest water that nature provides, is that which falls in the open country, away from contaminating influences, at the close of a protracted rain-storm. It differs from distilled water only in being charged with the pure and natural gases of the air. Perfectly pure water can only be obtained by distillation. It tastes flat and mawkish, because it does not contain the solid matter that we are accustomed to drink.

Water is usually divided into hard and soft. Hard water is that which contains compounds of lime and magnesia in solution. Soft water is that which is free from mineral matter. It is rain and snow water, and that obtained from some springs, and is usually the most healthful, as it passes into organized tissues more readily than hard water. Its solvent and extractive action is

also greater, and therefore it is a better vehicle for conveying nutritious substances into the living system; yet a water moderately hard is not usually detrimental to health.

The chief source of danger in drinking impure water is from what is called organic impurities such as arise from decayed leaves, insects, decomposing bodies of dead animals, the wash of ground contaminated with effete and decaying matters, and the drainage of cesspools, barnyards, sinks, pens, and similar places. Wells should therefore be widely separated from places where the water is liable to become contaminated by infiltration from the surrounding surface; and cisterns should be properly constructed, kept clean, and then if the water is filtered and a little ice added, nothing better can be obtained in the way of an aqueous luxury.

Tea, coffee, chocolate, and cocoa, are familiar to everybody, and either one or the other of these drinks are used daily by most persons, many of whom have become so habituated to the use of their favorite drink, that they "could not enjoy a meal without it." They are slaves to their beverage the same as the tobacco-user is a slave to tobacco, or the whiskey-drinker a slave to whiskey.

Tea acts on the human body as a stimulant, sedative and astringent. The ingredients of tea to which it owes its action, are theine, tannic

acid, and a volatile oil. If eight or ten grains of theine, the quantity contained in an ounce of good tea, are swallowed, it causes the heart to beat stronger, the pulse to become more frequent, the imagination to become excited, the thoughts to wander; visions begin to be seen; the body trembles; and a peculiar state of intoxication supervenes: these symptoms are followed by and pass off in deep sleep. Tea-drinkers of course do not take eight or ten grains of theine at one dose; they merely take one or two cups of a hot infusion of tea, which has a far different effect.

Tea is the favorite drink of women. It diminishes the need of food while it quickens the activity of the nervous system. Excess in the use of tea causes indigestion, headache, lowness of spirits, and faintness; but used moderately it enlivens the mind, soothes the body, and lessens the waste of the system; therefore it may appropriately be designated as "the cup that cheers, but does not inebriate."

Coffee owes its properties chiefly to the presence of an alkaloid called caffeine (which is identical in properties with theine of tea), and volatile oil. Both of the ingredients contribute to heighten vascularity and nervous activity, and at the same time retard the decomposition of the tissues

The effect of coffee is to arouse, exhilarate, and keep the drinker awake, and, to a certain extent, allay hunger. It counteracts the stupor occasioned

by fatigue, by disease, and by opium; it gives increased strength and vigor to the weary, and imparts a feeling of comfort and repose; but, like tea, it is injurious when used to excess, and persons of sedentary habits should not make a daily use of strong coffee.

Chocolate and cocoa are manufactured from roasted cacao beans, which grow in the West Indies, Mexico, and South America. The chocolate and cacao are made into a paste by long trituration in a heated mortar, with sugar, vanilla and cinnamon, and then poured into a mold and left to harden and dry.

Chocolate and cocoa are composed of albumen, fat, and a nitrogenized principle partaking of the active alkaloid of both tea and coffee — theine and caffeine — and with the presence of sugar they are nutritious as well as grateful beverages. They are more healthful when pure than tea or coffee; but at the present time, when almost everything is adulterated, it is difficult to obtain a pure and reliable article. The mode of preparing tea, coffee, chocolate, and cocoa is familiar to every one, and requires no special mention.

Medicinal drinks are so called because they form an important part in medical practice as accessories to medicine, and in some cases, as absolute remedies. They are prepared by boiling and by infusion; and are used to quench thirst, allay heat, abate fever, and supply the system with nutriment.

Those prepared by boiling are called decoctions, and in their preparation, the drug or substance used should be first placed in cold water, and should be gradually heated, as this insures the complete extraction of all the soluble principles; the albuminous matter being subsequently coagulated as the heat is near the boiling point. The time of actual boiling should not exceed ten or fifteen minutes. If the drug or substance be at once immersed in boiling water, the albumen contained in the cells would be coagulated, and thus interfere with the extraction of the other principles.

Infusions are watery solutions of the soluble principles of substances or drugs obtained by maceration or digestion in hot or cold water, and differ from decoctions only in the lower degree of heat employed in their preparation. Those substances which contain volatile and other principles which would be dissipated or injured by boiling, should be prepared in this way.

The following are some of the most valuable formulas of both decoctions and infusions, and probably every family at some time or other, will have occasion to use some of them.

Beef Tea. Cut fine one pound of fresh lean beef; put it with one quart of cold water in a suitable vessel, and let it stand a half-hour, then place it over a slow fire where it can be gradually heated

for an hour, at the expiration of which time it should reach the boiling point and boil ten or fifteen minutes, when it may be strained, seasoned, and is then ready for use.

Beef tea as thus prepared is highly nutritious, with an agreeable rich meaty flavor, and is especially valuable for persons who are weak, emaciated, and with feeble vital powers from impoverished blood; and also for persons when the digestive powers will not admit of solid food.

Mutton, Chicken, and Veal Broths. Either of these may be made the same as beef tea, but should be boiled much longer. Use the fleshy part without fat. A little rice may be added, and they may be flavored with celery, parsley, or an onion if desired. Strain, season, and they are ready for use.

Rice Water. Wash carefully two tablespoonfuls of rice; place it in five pints of cold water, and gently heat it for three hours, and then boil slowly for one hour, and strain. It may be sweetened and flavored with orange peel. Rice water when used as a drink in diarrhœa, may have a little brandy of the best quality added to it.

Barley Water. Take two ounces of pearl-barley, carefully washed, and boil it twenty minutes in one quart of water, in a covered vessel. Strain, sweeten, and add the juice of one lemon, and it is then ready for use.

Barley water, the most ancient of fever-drinks,

is readily digested, is nutritious, unirritating, and, in many cases, is superior to drinks made from any other cereal. The decoction may be rendered more or less nutritious by longer or shorter boiling, according to the state of the patient.

Oatmeal, sago, or flour, may be used for the same purpose, except that powdered substances are to be first mixed into a paste with cold water.

Buchu Tea. Pour one pint of boiling water upon one ounce of fresh buchu leaves, and let it stand in a covered vessel two hours, and then strain.

Buchu tea is useful in disorders of the urinary organs. It contains all the virtues of buchu, and is preferable to more concentrated forms of the medicine. Frequently an infusion is made with equal proportions of buchu and bearberry leaves, and in most cases gives better results than the buchu alone. Dose, from one half to a wineglassful.

Cayenne Pepper Tea. "Take of capsicum in coarse powder, half a troy ounce, boiling water a pint. Macerate for two hours in a covered vessel, and strain. U. S.

"MEDICAL USES. — Infusion of capsicum is used almost exclusively as a gargle in the treatment of pseudo-membranous and gangrenous affections of the *throat,* including those conditions in *scarlet fever* and the forming stage of simple inflammation of the same part. No other local treatment is more efficient, and none, perhaps, as much so. When

patients are unable to use the infusion as a gargle, it may be applied with a mop. The following preparation has had a great reputation in malignant sore throat: Take two tablespoonfuls of capsicum, and the same quantity of fine salt; beat them into a paste with a little water, and add half a pint of boiling water. Strain off the liquor when cold, and add to it half a pint of very sharp vinegar. Of this the dose for an adult is a tablespoonful every half hour. Except when the throat is covered with false membrane and with sloughs, the acrimony of this preparation is not easily borne." — *National Dispensary.*

Clove Tea. Take one teaspoonful of bruised cloves, and one pint of boiling water, mix them in a covered vessel, and let it stand for two hours, then strain.

Infusion of cloves may be given in tablespoonful doses to allay flatulent colic, and nausea from exhaustion.

Boneset Tea. Add one ounce of boneset to one pint of boiling water, and after the mixture has stood two hours in a covered vessel, strain.

Boneset tea has been used alone, and in connection with quinine for intermittent fever, and also to produce perspiration. For the latter purpose it should be given hot. The dose is from one half to a wineglassful. Frequently an

infusion is made with equal proportions of boneset and hops.

Juniper Berry Tea. Mix one ounce of bruised juniper berries with one pint of boiling water, let it stand for an hour in a covered vessel, then strain, and a little pure gin may be added if desired.

This preparation has a stimulant and diuretic effect, and is used in dropsies and in chronic affections of the urinary passages. Its effect on the kidneys may be increased by the addition of parsley, horse-radish, or buchu leaves. The dose of the infusion is a wineglassful every three hours.

Flaxseed Tea. Take one ounce of flaxseed, not bruised, and two drachms of licorice root cut fine. Add them to one pint of boiling water, and strain after the mixture has stood two hours in a covered vessel. The juice of a lemon and a little honey may be added if desired.

This preparation may be used freely for coughs and colds.

Tar Water. Mix one pint of tar with two quarts of water, and shake the mixture frequently during twenty-four hours, and then strain.

Tar water may be used in doses of from one half to a wineglassful to relieve chronic bronchitis and mucous disorders of the urinary organs.

Sage Tea. Mix one ounce of fresh sage leaves with one pint of boiling water, and let the mixture stand one half-hour in a covered vessel, and then strain.

This is an ancient medicine; it is stimulant, tonic, and astringent. Taken cold in wineglassful doses, it moderates excessive sweats. Fifteen drops of aromatic sulphuric acid added to a wineglassful of the tea, and taken every three or four hours, usually proves an effectual remedy for the sweats of consumptives. When sage tea is used as a mouth wash, a little borax, alum, or chlorate of potash, may be added to it.

Ginger, pennyroyal, wormwood, camomile flowers, dandelion root, fennel seed, spearmint, peppermint, rue, etc., are among the other articles used for drinks made by infusion. They may be prepared the same as other infusions, but use a little care and not make them too strong by adding too much. When the object of giving drinks of this nature is to produce perspiration, they should be given hot; but if perspiration is not desired, they should be given cold.

Facts and Fallacies concerning Eating and Drinking. There is a great diversity of opinion among the mass of people as to what constitutes a proper diet. This is due to the fact that as people are differently constituted, one may eat what another cannot; and that the relation between certain

kinds of food and drink, and the wants of the body, require some study and care to be properly understood. Every one is willing to admit, however, that the journey of life is beset with temptations to eat and drink certain things which experience has proved to be unsuited for us.

If our food is not carefully selected, properly cooked, or thoroughly masticated, we are painfully reminded of the fact by the symptoms of indigestion, if in no other way; but when our food is properly selected, prepared, and eaten, the process of digestion is not made manifest by a conscious sensation.

Hunger is a sensation which indicates that the system requires more nourishment; it differs from taste, which merely indicates the pleasantness of the food while in the mouth. The appetite in preference to taste, therefore, should be our guide in supplying the wants of our bodies. Those who eat and habitually overload their stomachs merely because food tastes good, engender disease and shorten their lives; for as a rule, there is no digestion without appetite.

The appetite is influenced by many circumstances. In certain diseased conditions, extreme anxiety, fatigue, anger, or unusual excitement, the appetite fails. It also may be suspended by sudden mental emotion, as when a person very

hungry sits down to eat, but just before taking the first mouthful, receives news of the death of a near relative or intimate friend; the appetite is gone at once, overcome by grief, and may not return for several days.

Although the appetite usually fails in disease, there is certain diseased conditions in which there is a voracious desire for food; but generally associated, however, with feeble power of digestion. This is the case in some states of dyspepsia, and during convalescence from fevers, when the appetite returns before the power of digestion. Idiots usually have an extraordinary appetite, which they indulge to excess when an opportunity offers. If food is eaten according to the appetite in these cases, it gives oppression and weakness instead of strength and vigor.

Aside from disease, an individual may have an appetite for much more food than his body requires. A healthy man may indulge in the perverse habit of excessive eating because he has a bountiful supply of food, and because it is pleasant to his taste; he thus distends his stomach greatly beyond its natural capacity, and by repeated indulgences or indiscretions, the enlarged and unnatural state of the stomach becomes permanent. He has cultivated that condition in which his stomach will not act upon

a small quantity of food; it is accustomed to great distension, and to relieve the hollow feeling, the appetite has acquired a corresponding increase of voracity. Those with this habit are no better nourished than those who eat less, as only sufficient food is assimilated for the wants of the body, and the excess passes through the system as waste material. Perhaps a remedy for persons afflicted in this way would be to spend six months at the average city boarding-house, for landladies frequently use their best endeavors to reduce the capacity of their boarders' stomachs. Although there are gluttons in all classes of society, they are exceptions among intelligent people, and in civilized lands.

People as a rule, eat too little rather than too much; especially in our large cities, where thousands of unfortunate children die of actual starvation because their parents are too ignorant or too poor to give them what is necessary to sustain life. Men, and women too, are sometimes forced by extreme poverty into a systematic habit of unintentional starvation; or they may have money, but be too penurious and ignorant to supply themselves with sufficient nutriment for the demands of their bodies, and gradually day after day their vital powers decline, strength and bodily weight slowly become less, and they become moody, ill-tempered, and repulsive. Then

comes disease, perhaps slight at first, but the body being in so poor a condition to resist it, a long, lingering sickness and death frequently result. The process may be slow, but it is sure.

The quantity of food necessary to preserve health and sustain life depends upon an individual's age, occupation, habits, state of health, and the climate or temperature in which he exists. Therefore no definite or satisfactory rule can be prescribed for all. Labor, either mental or physical, in fact, every thought and every motion of the body causes waste of the tissues, and the quantity of nutriment a man requires varies chiefly with the energy and quantity of action which the system is called upon to sustain. Persons who labor hard, and those who have active habits or exercise a great deal, require more food than people of sedentary habits or idlers; but the same man does not require the same quantity of food when engaged in light employment, as when laboring hard. Nutritive wants change with habits.

Frequently men accustomed to active exercise suddenly discontinue their labors and lead a sedentary life, but their appetite, unfortunately, is not so quickly reduced, and they eat the same quantity of food as before, which, being in excess of their nutritive wants and digestive

powers, the stomach is overburdened, and dyspepsia with its usual train of evils follow. Light employments are not necessarily injurious to digestion, as has been supposed; but as they require less activity, there is less waste, less use for food, and as a consequence, less digestive power; and food, as a matter of course, becomes oppressive and injurious when these conditions are disregarded.

In a state of health the digestive powers of the stomach correspond with the nutritive wants of the body, and when a man eats sufficiently to supply these wants, and no more, he feels satisfied and refreshed; but if on the contrary he consumes more than enough, he experiences a full, oppressive, uncomfortable feeling, which is a hindrance to both business and pleasure.

If a man would make a distinction between appetite and mere taste, and then leave taste out of consideration and follow only the dictates of his natural appetite, it would be a better guide to him in selecting food and measuring its quantity, notwithstanding its liability to perversion, than all the hygienic rules that have ever been formulated.

We should eat to obtain nourishment and strength, and not for the mere pleasure of swallowing delicacies that tempt the palate. There is a tendency among ladies when enter-

taining guests, to offer and urge them to eat a quantity of rich, delicious food, highly pleasing to the taste, but not adapted to the wants of the body, and thus they impose a burden on their friends' stomachs in their well-intentioned efforts to please them.

The advice of Socrates, a Greek philosopher, born B. C. 469, although over two thousand years old, may be followed with advantage on such occasions. It was, "Beware of such food as persuades a man, though he be not hungry, to eat; and those liquors that will prevail with a man to drink them when he is not thirsty."

How often should we eat, and when is the best time? This is a question often asked, and variously answered. Diogenes, an eccentric Greek philosopher, born B. C. 413, said that the proper time to eat was, "for a rich man when he could get an appetite, and for a poor man when he could get food." This advice, however, does not tell the number and time of meals best adapted to the wants of the body. People, as a rule, enjoy better health, and find the wants of their bodies best supplied, by following the established custom of eating three regular meals daily — breakfast, dinner, and supper; and as the appetite is easily trained to regular habits, these meals should be served at regular hours; but

children, and active growing young people, require food oftener than fully developed adults. Those recovering from typhoid fever and other diseases in which the body is wasted, also require nourishment at shorter intervals than the healthy, that their bodily loss may be restored. It is better for children, and those recovering from sickness, to eat often, in moderate quantities, than to wait several hours and then eat to excess.

Healthy adults feel the desire for food at their usual hour of eating; then their appetite has returned, their stomach craves food, and the gastric juice is ready to flow and digest it; but if they do not eat, the demands of their appetite may become urgent, and after a time cease, until the next usual hour of eating, when it returns with increased force. When regular hours of eating are observed, the stomach regulates its wants in accordance with the periods of supply; but when a regular meal is omitted, the stomach is apt to become burdened with an excessive quantity at the next meal, and the digestive powers are thus overtaxed.

Breakfast, the first meal of the day, should be eaten within an hour after rising, for most persons experience an uneasy sensation of languor or faintness in the morning until they have eaten something. One would naturally suppose from

the long interval between the morning meal, and the meal the previous evening, that they would have a greater appetite for food in the morning than at any other time during the day; but such is not the case, for during the hours of sleep there is little or no action of the body, and therefore but little waste.

Dinner, the chief meal of the day, is eaten by different persons at different hours. The established hour with most people is between twelve and one o'clock, but with business men in our large cities this is often their busiest time, and therefore they take a lunch in the middle of the day, and eat their dinner late in the afternoon or early in the evening. This, under the circumstances is the best course for them to pursue, but the middle of the day is the best time for people to eat dinner who can have a quiet leisure hour regularly every day at that time.

Supper, the evening meal, should be eaten about three hours before sleeping. Late, hearty suppers are injurious to health, because active digestion and sleep mutually disturb each other; still, the opposite extreme of sitting up late and going to bed tired, hungry, and with a faint and empty feeling in the stomach, is also injurious to health. In such cases a little light, easily digested food usually prevents unpleasant effects.

"The general custom of three meals a day—

a good breakfast soon after rising in the morning, a fuller and more nutritious meal near the middle of the active part of the day, and a lighter meal a few hours before sleeping — meets the wants of the body, and corresponds with the powers of digestion. But when we add to these lunches during the day, or take a supper of feasting for hospitality or self-indulgence at night, we overstep the demands for nourishment, and overtask the powers of digestion, and prevent the full, refreshing effects of sleep at night." — *Dr. Jarvis' Physiology and Laws of Health.*

The importance of taking our meals at regular hours, and thus avoiding an intensely hungry, faint feeling, cannot be over-estimated in supplying the wants of the body. Dr. Jarvis speaks as follows on this subject:

"The animal system sustains all active labor and exposure best when it is well nourished. When the nutriment fails, it becomes sooner fatigued, and more susceptible of pain; and, besides this, it is more liable to suffer from any causes which would impair its soundness or diminish its vitality. The contagion of disease, the infection of fever, whatever may bring on disorder, act more readily and powerfully on the hungry, and on those who are badly nourished, than on those who are well fed. We are better able to resist the influence of cold and to maintain the natural temper-

ature of the body, when we are full, than when we are fasting."

The mind and body both, should rest a short time before and after each meal, for mental and physical activity interferes with digestion. When the body is tired out or much fatigued, the stomach participates with the other parts of the system in the exhaustion, and is unfitted for the reception of food; therefore a short interval, if only a few minutes, should be allowed before eating for repose. Intense mental excitement, especially anger, anxiety, and grief, should be avoided during meals; but if the mind is lightly occupied, as in cheerful. exhilarating conversation, it aids digestion instead of retarding it.

When any portion of the body is actively exercised, the whole system is taxed to sustain it; therefore if full, vigorous action be attempted in two parts of the body at the same time, they cannot be sustained; one or the other will fail, or both be imperfect. After a hearty meal, when the stomach is full, one feels rather indisposed for a short time; active work is then more difficult to perform, and we naturally prefer to postpone labor either mental or physical until the digestive process is partially over. An experiment has been tried with two dogs. They both were given a hearty meal, then one of them confined to its kennel and the other put upon the chase. They

were both killed after a short time, when digestion was almost completed in the one at rest, while it was not even begun in the other — the food having remained the same as when swallowed. This shows the necessity of rest immediately after meals, and that exercise if indulged in, should at first be very moderate.

Eating too fast is almost as bad as excessive exercise after meals, and is one of the chief causes of dyspepsia. We cannot properly masticate our food when eating rapidly, and it is swallowed in large lumps; and as these must be converted into chyme by the solvent properties of the gastric juice, and the muscular action of the stomach, more labor is required of the digestive organs than when the food is chewed fine.

The food adapted to our wants, although simple in composition, varies greatly in form and gustatory properties, and our means to accomplish the same physiological end are free and extensive. The saying, "variety is the spice of life," is true as regards food. Although restricting the number of dishes at each meal, there should be a generous and attractive variety which should vary at successive times of eating, according to our means, appetite, and art of cooking. A moderate variety of food is more palatable and digestible than one or two kinds alone, and our appetite instinctively craves meat with vegetables, sweet with sour, liquids with

excessively dry food, etc. The kind and form of food best adapted to supply the wants of the body vary, as previously stated, with each individual. No one rule of diet can apply to all. The nutritive wants of all human beings are supplied by what are called "food and drink;" yet nature has established a special law which governs the nutrition of each individual, and every person must understand its general principles in determining what food and drink are best adapted to supply the wants of their own body. This law is founded upon age, sex, habits, climate, etc. When there is a vast difference in people, in their mode of life, and in their surroundings, there is a corresponding difference in the food and drink best adapted to their health and well-being, and every individual, therefore, has nutritive wants peculiar to himself.

IV.—ALCOHOLIC DRINKS.

Their Composition, and their Medicinal, Pleasing and Poisonous Effects. Alcohol, the essential ingredient of alcoholic drinks, is a colorless, volatile liquid, having a burning taste, and an agreeable, well-known, spirituous odor. Its chemical composition is carbon, hydrogen and oxygen, and when it is absolutely pure it cannot be frozen at any known temperature. It is very combustible, burning with a bluish-white, non-luminous flame producing intense, heat but no smoke.

Alcohol, absolutely pure, is seldom met with; it attracts water, combines with it in all proportions, and when the two are mixed, an elevation of temperature is observed, and the bulk of the resulting liquid, when cooled, is less than that of its components. It is often important to know the amount of alcohol contained in a mixture; therefore an instrument called the alcoholmeter, a modification of the hydrometer, has been constructed, by means of which it can be easily and accurately determined.

Alcohol is officinal in the United States Pharmacopœia as *Alchohol fortius*, specific gravity 0.817,

which contains 92 per cent. of alcohol; *Alcohol*, specific gravity 835, 85 per cent; and *Alcohol dilutum*, made by diluting alcohol with an equal measure of distilled water, specific gravity 0.941, 39 per cent. Besides the specific gravity of the different officinal alcohols shown by the alcoholmeter, their purity is determined by their odor, miscibility with water, complete volatility, and their behavior to nitrate of silver.

Alcohol is a solvent of great value. It is employed in the manufacture of alkaloids, and other proximate principles, of resins, numerous extracts, some plasters and chemicals. It usually exerts but little chemical action upon the substances which it dissolves, and is easily expelled by a gentle heat, owing to its volatility, leaving the substances which it previously held in solution in a pure state. Alcohol is also a permanent ingredient of all spirits, tinctures, most fluid extracts, some mixtures, solutions, liniments, a few infusions, wines, syrups, etc.

Alcohol may be obtained by subjecting to distillation any saccharine solution (solution of sugar) that has undergone fermentation. It is usually obtained from corn, rye, potatoes, and other starchy substances which require to be *mashed*, during which process the starch is converted into sugar by the gluten contained in the substance used or by the diastase of malt added with this object in

view. After the starch is converted into sugar, fermentation will speedily set in on the addition of yeast if the temperature be kept within the limits of sixty-five degrees and eighty-two degrees F. When the temperature is too low, fermentation proceeds slowly, and when too high, mucilage and lactic acid are apt to be formed. There should be about one part sugar to four of water. Too large a quantity of sugar arrests fermentation, as the alcohol formed destroys the vitality of the yeast plant. After the solution has undergone fermentation, absolutely pure alcohol may be obtained by careful and repeated distillation and the adoption of methods where substances are used which completely separates the water from the alcohol.

Alcoholic drinks are composed of alcohol, water, and various accompanying substances, such as sugar, acids, ethers, volatile oils, albumen, tannin, bitter extractive matter, coloring matter, etc. There are different ingredients in the different drinks, but alcohol and water form their great bulk. The quantity of alcohol varies in them from one to fifty-six per cent.

Cider, beer, and ale, contain from one to ten per cent. by volume, of absolute alcohol. Wine, the fermented juice of grapes, contains from five to twenty per cent. of alcohol. Brandy made by distilling wine, contains from forty-eight to fifty-six per cent., and whiskey obtained from fer-

mented grain by distillation, contains the same quantity.

The value of alcoholic drinks does not depend merely upon the quantity of alcohol they contain, but upon their flavoring ingredients and various substances which modify the effect of alcohol upon the system. The peculiar effects of a given quantity of wine, for instance, differs greatly from that produced by an equal quantity of water containing a like percentage of alcohol. The effect of the many different varieties of alcoholic drinks varies in accordance with their constituents; and the effect of the same drink varies with different persons.

Alcoholic drinks are familiar to every one as a remedy for debility. Wine has been used both as a medicine and as a beverage, from the earliest time known, and the first sin committed after the deluge was drunkenness. The physiological action of wine is described in the *National Dispensatory*, as follows:

"Wine, including all forms of genuine wine, is essentially a stimulant of the nervous and circulatory systems; but its mode of stimulation is quite unlike that of alcohol. In due proportion it gives to all the faculties increased activity and freedom of action, quickening and brightening the intellect and imagination, warming the feelings, invigorating the digestive powers, and

diffusing a cordial satisfaction throughout the whole being. Distilled spirits, on the other hand, tend to benumb the faculties even while stimulating them, so that they seem to be struggling under a brute force; the exhilaration they produce is usually fierce or maudlin, and they leave behind them a dull and inert dejection. As already stated, the peculiar effects of wine are due to the salts, acids, sugar, and, above all, the ethereal elements in which it abounds, and which, while they tend to mitigate the anæsthesia produced by the alcohol of the liquid, insure a more rapid discharge of this substance from the system. In excessive doses, the effect of wine resembles more nearly those produced by distilled spirits; yet even these are less extreme and debasing. Its habitual use is conducive to the health of those who drink it in moderation, and is the best corrective of the brutality and preventive of the crime which everywhere attend the consumption of ardent spirits. The very quantity of it required to produce intoxication, tends to limit the mischiefs of its excessive use; and, even when 'the sweet poison of the misused wine' is indulged in beyond measure, its mischievous influence upon the health is less than that of alcohol; for while the latter tends directly to occasion fatal disease of the liver, heart, and kidneys, the intemperate use of wine is more apt to engender

gout, gravel, and nervous affections. Even these results are rarely attributable to some of the sorts of wine which are most largely used, as the Rhenish, Bordeaux, and most Italian wines."

Pure wines, unfortunately, are difficult to obtain, for most of those in the market are adulterated, and many of them are even made artificially. Dishonest dealers frequently mix alcohol with water, and add poisonous ingredients, to give the mixture the flavor of the wine, or any other alcoholic drink that they desire to imitate.

Genuine brandy of good quality is also difficult to obtain. The true article, that made from wine, has qualities peculiar to itself. It is not only more palatable, more cordial to the stomach, but produces a more grateful exhilaration than any other distilled spirit.

Lager beer and whiskey, however, are more extensively used in the United States than other alcoholic drinks. Probably this is because they are comparatively cheap, and because pure wine and brandy are not readily procured. Lager beer makes a man corpulent, and gives him a coarse, gross appearance, and as a stimulant it has no virtues when compared with a good pure wine. Whiskey is spoken of in the *National Dispensatory* as follows:

"The action of whiskey, both immediate and remote, differs in many respects from that of

brandy; and the former liquor made from rye is not identical with that distilled from wheat; nor are potato brandy and grape brandy alike in their effects. Whiskey, and also gin, besides being less palatable, to all but the coarsest tastes, than brandy, are much more apt than the latter to produce functional and then organic disease of the stomach, liver, and kidneys, and their immediate operation is less genial and exhilarating. In the absence of pure brandy, whiskey is probably the best of the alcoholic distilled liquors, since its comparative cheapness in a great measure removes the temptation of dealers to adulterate it."

People may be divided into four classes, and the views of each class in regard to the use of alcoholic drinks, differ greatly. There is the teetotaler, the occasional moderate drinker, the habitual moderate drinker, and the drunkard. The teetotaler firmly believes that it is best for the human race to entirely abstain from all fermented and distilled liquors. They "touch not, taste not, and handle not," and many of them are so radical in their views that they would not take a drop of alcoholic liquor even as a medicine in sickness.

Proper encouragement should be given the spirit of self-sacrifice for the good of others, and we highly honor those who from conscientious motives, and for the supposed good of their

fellows, take the pledge of total abstinence; but the advocates of teetotalism, although accomplishing much good, frequently do unintentional harm. The terrible evils resulting from the excessive use of fermented and distilled liquors should be avoided; alcoholic drinks should not be used habitually as a beverage, but their proper and judicious use should not be discountenanced and prohibited.

Teetotalers think only of the thousands of people who, through the excessive use of ardent spirits, are in almshouses, asylums, jails, and prisons; and of the idleness, poverty, disease, and crime of the unfortunate men and women before finding a home in these places. They therefore regard all forms of alcoholic drinks merely as stimulants which develop vagabonds, ruffians, blacklegs, gamblers, robbers, incendiaries, and murderers, and incites them to go to extremes in their infamous crimes. They believe in total abstinence because they view the subject only in this light; but this is as little an argument in favor of general teetotalism, as if some one were to assert that because fire when not properly used and controlled is a very destructive agent, and that, therefore, we should abstain from the use of fire.

The occasional moderate drinker uses alcoholic drinks as a medicine, but not as a beverage; as an

exhilarating stimulant to rally his vital energies when on the eve of exhaustion, but not as a mere pleasing cordial; or in other words, he uses them for their effect, but not for their taste. We all require the occasional use of stimulants in some form or other, and every person uses them; some prefer alcoholic, some tobacco, some tea, some coffee, etc., etc. Alcoholic drinks exercise a peculiar fascination to those familiar with their pleasing effects, when under the pressure of worry and mental dejection.

Teetotalers, so called, who abstain from the use of alcoholic drinks, even the occasional moderate use in their mildest form, use tea, coffee, tobacco, or other substances. They not only use their favorite stimulant when they feel inclined, but frequently use it in excessive and poisonous quantities.

Stimulants are necessary to happiness, health, and life, for all organs of the body live by stimuli, which in temperance animate, and in excess destroy. The stimulus of the eye is light, but its intensity will destroy sight. The stimulus of the ear is sound, but too loud a noise deadens hearing and causes deafness. The various organs of the body fail when the stimulants required for their existence are withdrawn or received in excess. Temperance, not abstemiousness, prolongs life. Happiness is conducive to health, but joy will kill by its excess and suddenness.

Mental anxiety causes the nervous system to become depressed and exhausted, and to avoid sickness, the flagging and worn-out nerves require some form of stimulant to rally their vital energies. When we are exposed to cold wet, and suffer hardships, mild stimulants minister relief and preserve health. The reason why alcoholic drinks are such a terrible devastator, is because people use them as a beverage instead of a medicine. In moderate doses they stimulate, but in excess they destroy. Their temperate use benefits the nerves in times of depression, but their excessive use disorganizes their functions.

The moderate use of alcoholic drinks in time of need softens our nature and makes us more kind-hearted and benevolent than our cold reason would naturally let us be. They give us warmer emotions and larger sympathies, and make us more friendly, social, and courteous than perpetual sobriety will permit us to indulge in. They will also stimulate thought, and reveal men's intellectual powers which may be slumbering within them, and will show to age, by occasions, that its youth still lies within it.

These are the pleasing effects of alcoholic drinks, and in them lies man's danger. People become fascinated and drink to excess; then there is over-stimulation, and the brain becomes befogged. The intellectual faculties are disturbed, or there is intel-

lectual drowning, so to speak, and the animal, instead of the intellect, controls the victim.

The habitual moderate drinker who uses alcoholic drinks daily as a beverage, destroys his health and shortens his life, perhaps, without even suspecting it. He is secretly establishing disease, and his stomach, liver, kidneys and brain, will successively become deranged, and the diseased condition will cause him much annoyance and hasten his death. Alcoholic drinks of good quality when taken occasionally in small doses aid digestion, but when used habitually, or when taken in excessive quantities, they disturb and arrest the digestive process. They act when taken in excess, as an insidious poison, and excite and foster disease with fatal pertinacy.

The harmless or injurious effect of alcoholic liquors on the system is not only determined by their quantity, but by the skilful adulterations palmed upon us as genuine articles. Those who drink fermented and distilled liquors, usually have neither the knowledge nor the means of testing them before drinking; and frequently their taste is so accustomed to the poisonous compounds that it is perverted and they prefer the adulterations to the healthy produce.

The drunkard has become so fascinated with the pleasing effects of alcoholic liquors that he drinks to excess. He feels at times an almost

insatiable craving for ardent spirits, and indulges in them in repeated and increased doses. Probably he never intended to drink sufficiently to bring him to that state known among drunkards as "the horrors," but through habitual and excessive use of stimulants, he has become so diseased that his only object in life is to gratify his morbid craving for alcohol. The physiological effects of the excessive use of alcohol are described in the *National Dispensatory*, as follows:

"Habitual excesses, according to the form and quantity of the alcohol consumed, tend to increase fat, and diminish muscular tissue, and to render the capillary bloodvessels everywhere turgid, giving to the skin, especially of the face, a puffy and purplish look. The digestion becomes impaired, the nervous system unsteady, the gait loses its elasticity, the hands grow tremulous, the senses dull, and the mind torpid; the sleep is broken, dreamy, and unrefreshing. After unusual excesses, delirium tremens is apt to occur, and habitual drunkenness, sooner or later, in many cases, induces a state of chronic imbecility, with partial paralysis. Fatty heart, cirroused liver, and granular kidneys, are frequent associated lesions, producing fatal dropsy, especially if distilled liquors have been employed, while gout is a more usual result of intemperance in wine."

The average expectation of life of an individual

twenty years of age, who has intemperate habits, is only fifteen years, provided he does not reform; but it is very difficult to convince a young man of the fact. The habitual drinker is so fascinated with his beverage, that he cannot realize the danger to his health and life, and it is almost impossible to convince him before degenerative changes occur in his body. His repentance then comes too late, for years of the most complete abstinence will scarcely suffice to restore his health.

Persons with feeble stomachs from deficient gastric secretion, may be benefitted by taking with their meals a small quantity of mild wine, which stimulates the stomach to pour out a more copious solvent, and thus promote digestion; but in health the stomach is thus made to digest more than the body requires, and in this way many persons get an excess of fat. Those in health who use alcoholic drinks, should use great care and remember that their habitual use gives them a constitution of a peculiarly treacherous character. Their apparently robust health will vanish with unusual rapidity when attacked by any acute disease.

If young men would abstain entirely from alcoholic liquors, and also tobacco, tea, and coffee, until the age of twenty-five, drunkenness would be almost unknown by the next generation, for

intemperance is usually the result of habits formed in youth. It is worse than foolish for young people to use these stimulants when they are not sick, and their use is nothing more than a mere cultivated habit.

Youth is ambitious and full of hope, which promises happiness, honor, and fame. The nervous system of youth does not require stimulants, for it is not exhausted by trouble, unrealized wishes, or blasted expectations. Middle life, however, brings with it its doubts, troubles, and afflictions, its aspirations chilled by experience, and, when battling with stern realities, there may be times when stimulants are of actual benefit. Organs below par, from debility, may be brought up to a nominal tone by their use in time of need, provided they are not used to excess.

No fixed rule can properly guide a person in the use of stimulants. Established facts and individual experience must be taken into consideration, and "in all these matters," says Dr. Beard, "each one must work out his own salvation with fear and trembling." The same author in his *Home Physician* says: "If you find by experience that you are positively benefitted by any one of these stimulants or narcotics, then use it with the same judgment and moderation that you would use any article of food on your table.

"If you find that you are becoming a slave to any one of these substances, disentangle yourself and make yourself master of the situation at all hazards, and at whatever cost. You may know that you are abusing your favorite stimulant — be it tea, coffee, tobacco, or alcohol — when you find that you are such a slave to it that you cannot possibly do without it.

"If, on the other hand, you find by experience that you are injured by any stimulant or narcotic that you may be in the habit of using — *no matter how moderately* — drop it as you would drop a hot coal, and never give it another thought, even though you see your friends about you on every hand using the same substance even more freely than yourself, not only without injury, but with real apparent benefit. In these matters every man must be a law unto himself."

The great antidote to intemperance and drunkenness is reason, education, and common sense. Most drunkards are either ignorant or low born persons. Although intelligent and educated people frequently use stimulants to excess, there is not as much gross intemperance among them as among the uneducated and low classes. The intemperance of the poor and ignorant, although often the cause of their unfortunate circumstances, is more frequently the result of their depressed condition.

The poor man may have but a slender meal, and by means of stimulants his deficient food is made to last him a longer time, although of course at the expense of his body; but he cannot comprehend it. Those people who are deficient in mental and moral training, when driven to the bar-room by hunger, thirst, or debility, have not sufficient moral force to stop drinking when the demands of nature have been supplied, and as a result, drunkenness with all its evils follow.

"Intemperance not only destroys the health, but inflicts ruin upon the innocent and helpless, for it invades the family and social circle, and spreads woe and sorrow all around; it cuts down youth in all its vigor, manhood in its strength, and age in its weakness; it breaks the father's heart, bereaves the doting mother, extinguishes natural affection, erases conjugal love, blots out filial attachment, blights parental hope, and brings down mourning age in sorrow to the grave. It produces weakness, not strength; sickness, not health; death, not life. It makes wives widows, children orphans, fathers friendless, and all of them at last beggars." — *Gunn's New Domestic Physician.*

Teetotalism, or total abstinence, is a needed straight-jacket for the confirmed drunkard, and for all persons that are too emotional, and lack judgment, reason, or self-control. Many persons are

so constituted that they cannot use alcoholic stimulants without using them to excess. They frequently wish to discontinue their use, and perhaps do so for a short time, but when their morbid craving for them returns, they again drink to excess.

It is a very difficult matter to suddenly give up the use of stimulants when the habit of using them has been gaining strength for a long time, but a drunkard cannot "taper off;" the only way he can reform is to abstain entirely from alcoholic drinks. If he takes one glass, he will crave more, and will get drunk again.

If he really wishes to reform, he should carefully think the matter over until there is no lingering doubt in his mind about the injury alcoholic drinks are doing him. He should understand the reason, and all the reasons, why they are not good for him. Then he should avoid the thoughts, the persons and the places that lead to the temptation to drink, and should frequent the places, associate with the persons, and indulge in the thoughts that lead away from the temptation. He should keep busy at something that will occupy his close attention, and not become discouraged and give up the struggle, even though he should break his resolution time after time. When the resolution has been broken, he should think the matter over carefully until he

understands why he failed, so that he may be on his guard against a recurrence of the same circumstances. The harder and more difficult it is to reform, only shows the greater necessity for reforming.

V.—NARCOTICS.

Narcotics are substances which in medicinal doses act as an opiate or anodyne, allaying pain, morbid sensibility, and producing sleep, but which in poisonous doses impair or destroy nervous action, causing stupor, coma, convulsions, and frequently death. The primary effect of most narcotics is of a stimulating character, which is manifested principally when they are taken in small doses.

The general action of narcotics is modified by a great variety of circumstances. Some persons can take them in full doses without unpleasant result, while others are nauseated, excited and stupefied by the smallest quantity. The power of narcotics is diminished in a remarkable degree by repetition. Opium eaters, therefore, find it necessary to gradually increase the quantity of opium that they use, in order to obtain the same effect. The climate or season also influences their action, larger doses being required in cold weather than in warm. Among the principal narcotics are opium, belladonna, conium, stramonium, hyoscyamus, lactucarium, aconite, extract of hemp, hops, lobelia, tobacco. etc.

Opium — Its Use and Abuse. Opium, the most energetic of narcotics, is the inspissated juice of a species of poppy, originally a native of western Asia and southeastern Europe, where it is found wild in fields and waste places. It is now naturalized in several countries, and is cultivated extensively in India, Turkey, Persia, China, Japan and Egypt for the production of opium, and as an ornament in gardens. The poppy has also been cultivated in the United States, and opium of fair quality, but in limited quantity, has been produced here.

Opium is procured by making superficial incisions in the green capsule of the poppy, in the evening, and the milky juice which exudes is ready for collection the next morning, when its color will have changed from white to brown. The numerous small seeds within the poppy capsule are destitute of narcotic properties.

The opium in the market is of dense consistency, brown in color, and has a peculiar strong aromatic odor. It becomes harder and darker with age, and has a bitter, acrid, and nauseous taste. It contains a great variety of chemical constituents, the most important of which is the alkaloid morphia, which exists chiefly in combination with meconic acid, an inert ingredient.

Morphia is a powerful sedative, and is the principle upon which the narcotic effects of opium

essentially depend. Morphia occurs in colorless rhombic crystals, inodorous, very bitter, and as it is not very soluble, is not employed medicinally except in combination with acids which form salts, the effects of which are nearly identical with the alkaloid itself.

The acetate of morphia, the muriate of morphia, and the sulphate of morphia are more generally used than any of the other salts of the alkaloid, and are all freely soluble in water. The sulphate of morphia, however, is used in preference to the acetate or muriate.

The salts of morphia possess the anodyne, hypnotic, antispasmodic, and diaphoretic properties of opium, and are considered less apt than the crude drug to produce unpleasant effect. They are especially adapted to the hypodermic and endermic methods of application which are resorted to when prompt action of the medicine is necessary to lessen pain or save life, and also when the patient is unable or unwilling to swallow.

Opium is one of the most valuable drugs in use, and it, or its alkaloid morphia, is the active ingredient of a large number of important medicines; as an anodyne it relieves pain and allays nervous irritation; as a hypnotic it produces sleep, and is positively contraindicated only where there is a tendency to apoplexy or coma, or where there exists an idiosyncrasy in regard to its effects. It is

also used as a stimulant in low fevers, as an arrester of secretion in diarrhœa, and as a diaphoretic in various conditions of the system. Opium is the great cough-relieving remedy, and most cough mixtures contain it in some form or other.

When opium is taken in medicinal doses, it moderately excites the circulation, increases the temperature of the skin, and produces that state of mind in which there is an agreeable indifference to everything. This is soon followed by diminished sensibility, drowsiness, sleep and diminution of all the secretions except that of perspiration, which is increased. In larger doses the first symptoms may be so transient as not to be noticed; then the mind becomes confused, and there is more or less complete unconsciousness, with slow stertorous breathing, very contracted pupils, slow, full pulse, and more or less lividity of the countenance. Nausea and vomiting are produced in some persons. After the deep sleep or coma produced by an over-dose, the return to consciousness is attended with depression of mind and body, headache, nausea, and constipation. When a fatal dose has been taken, the ordinary symptoms produced by the drug are intensified, the face becomes pale and cadaverous, the pulse sinks, the muscular system becomes relaxed, and coma continues until death, which is sometimes, especially in children, preceded by convulsions.

Opium is usually prescribed in the form of powder, or tincture (laudanum), or camphorated tincture (paregoric), but there are many other officinal preparations of opium in daily use. The habitual use of the drug in any form is attended with very pernicious effects, and it is to be regretted that the number of "opium eaters" in the United States has increased during the past few years; not only among residents of foreign birth, but among native born Americans.

The habitual use of opium or morphine, like the excessive use of alcoholic liquors, ruin a man financially, morally, and physically, but opium eating is by far the greatest of the two evils. It is difficult for a drunkard to reform, but it is infinitely more difficult for a confirmed opium eater to reform, and it is very rare that one does. Opium eaters not only use the drug in both solid and liquid form, but many addicted to its use have the equally pernicious habit of smoking it.

The injurious and fatal habit of opium eating is sometimes contracted by using the drug regularly day after day to relieve excruciating pain, but many persons, especially opium smokers, deliberately, foolishly and recklessly, place themselves in bondage from which as a rule, they are only relieved by death.

Those who use opium are at first fascinated with its pleasing and soothing effects, but after

a time the feeling of complete satisfaction fails to appear when the drug is used. They continue their ruinous habit, however, for should they attempt to abandon it, they experience such terrible suffering and intense craving for the drug that they appear to suffer the agonies of a thousand deaths without it.

A few persons addicted to the use of opium have discontinued the habit after an intense and prolonged struggle, by gradually diminishing the quantity of the drug consumed and substituting for it aromatic and astringent tonics. This is the secret of many so-called opium cures or antidotes. Another method of curing the habit consists in its abrupt cessation, but the number of inveterate opium eaters who reform is very small. The only absolutely certain way of avoiding its disastrous and ruinous effects is not to commence its use, and thus not get within its fatal fascinating power.

Tobacco-Smoking, Chewing and Snuffing. Tobacco was used by the natives of Cuba, by smoking cigars when the island was discovered in 1492; and pipe smoking was, probably, common among the aborigines of this continent long before its discovery. Sir Walter Raleigh on his return from an expedition to colonize America, introduced tobacco into England from Virginia, in 1586, since which time the habit of smoking, chewing, and

snuffing, has rapidly spread over the whole world.

Tobacco was not used in Europe until after the discovery of America, and soon after its appearance there its use was prohibited in many parts. Priests denounced its use as sinful, and physicians declared it hurtful to health. Pope Urban VIII. issued a bull excommunicating all persons found taking snuff while in church, and smoking was made a capital offense by one of the Sultans of Turkey. In Russia the penalty paid for smoking was to have the nose cut off, and King James I. used his best endeavors to suppress the use of tobacco in England.

Tobacco is a virulent poison, but notwithstanding its dangerous and destructive properties, and all the opposition to it in the past, the habit of using it, at the present time, is universally prevalent: and the tobacco plant is very extensively cultivated in most temperate and subtropical countries. There is no stimulant or narcotic that is used as extensively as tobacco, and the excessive use of the noxious weed among the educated men of our day, does more harm than the excessive use of alcoholic stimulants among the same class of men.

Nicotia, the poisonous principle of tobacco, is hostile to all forms of life, and it stands next to prussic acid in the rapidity and energy of its poisonous action. When taken into the human

system in small doses, it produces a hot, burning sensation in the mouth, a feeling of rawness in the throat, and profuse salivation. A sense of heat quickly appears in the stomach, chest, and head, followed by nausea, vomiting, purging, giddiness, torpor, indistinct vision, sleepiness, imperfect hearing, laborious and oppressed breathing, and dryness of the throat. Symptoms of great prostration soon appear, the nervous system becomes deranged, the pulse rate falls, the muscles become relaxed, the surface of the body cold, the face pale, the head droops, and faintness ends in loss of consciousness. When a little larger dose of nicotine is taken it produces an intensification of these symptoms with rapid death, or the poison may kill the victim in a few minutes, before the symptoms become developed. The physiological action of tobacco when taken into the stomach, is nearly identical with that of its active poisonous ingredient, nicotiana, just described.

Tobacco also contains an oil which is generated only in combustion, and accumulates in old pipes. It is a virulent poison, even when applied to eruptions on the skin, and a few drops of it taken into the human system, rapidly destroys life. In very small doses, its immediate effects are pallor, vertigo, faintness, nausea, vomiting, cold sweating, diarrhœa, and paralysis of the lower limbs.

Persons learning to smoke or chew tobacco, usually poison themselves to a greater or less extent in their first trials. The usual results of the first attempts to smoke are, nausea, giddiness, vomiting, or a feeling of deathly sickness, with cold sweatings and very feeble pulse.

The use of tobacco by young boys, or those who have not attained their full growth, is attended with the most pernicious results. Tobacco not only hinders the growth and development of the body, but deranges the nervous system, and impairs the eyesight and hearing; and the depressing influences of the insidious poison seriously damages the intellect.

The filthiness of smoking, chewing and snuffing, and the unpleasantness arising from the use of tobacco, are well known. Snuffing not only impairs the sense of smell and voice, but a snuffer is recognized by a certain nasal twang or asthmatic wheezing. Smoking is less filthy than chewing, but its influence on the system is as pernicious.

An inveterate user of tobacco must subject his system to the influence of tobacco at certain intervals, or he experiences an intense and peculiar craving which soon becomes an irresistable desire for the noxious weed. It is as difficult for an old smoker, or chewer, or snuffer, to discontinue the use of tobacco, as it is for a man accustomed to the use of alcoholic stimulants, to give up the use of

his favorite stimulant if helped by a powerful will.

The writer has never used tobacco in any form, and cannot speak of its physiological action from personal experience, therefore he will not attempt to portray the evil effects of smoking, chewing, or snuffing, but will take a condensed statement of these evils from the *National Dispensatory*, a standard authority, as follows:

"Tobacco lessens the natural appetite, more or less, impairs digestion, and induces constipation; while it irritates the mouth and throat, rendering it habitually congested, and destroying the purity of the voice. It induces an habitual sense of uneasiness and nervousness, with epigastric sinking or tension, palpitation, hypochondriasis, neuralgia, and frequent urination. Chewing and snuffing tend to cause gastralgia, but smoking neuralgia of the fifth pair. It renders the vision weak and uncertain, causing objects to appear nebulous, or creates muscæ volitantes, and similar subjective perceptions. In numerous instances it has produced amaurosis. Similar derangements of hearing occur, with buzzing, ringing, etc., in the ears, and even hallucinations of this sense. Often there is a feeling of a rush of blood to the head, with vertigo, and impairment of attention so as to prevent continuous mental effort; the mind is also apt to be filled with crude and groundless fancies, leading to self distrust and melancholy. The sleep is frequently restless, and

disturbed by distressing dreams. It impairs muscular power and coördination, probably both, by interfering with nutrition, and exhausting nervous force, and usually keeps down the growth of muscle, and the deposit of fat. Doubtless there are many persons who use tobacco in one or more forms, who experience few or none of these evils, and whose constitutions seem proof against its mischievous effects; but to the greater number, the habitual use of it is more injurious than useful, and it acts upon a certain number, in almost all doses, as a poison."

PART III.

MEN AND WOMEN.

HOW TO AVOID THEIR AFFLICTIONS AND SUSTAIN THEIR LIVES.

INTRODUCTION.

Men and women are liable to innumerable afflictions during the whole period of their existence. They commence at birth and terminate in death. Their effects — annoyance, pain, disease, injury and death — vary with their severity and with the power of resistance in the body.

If all the organs of the body would work together harmoniously until the vital forces are exhausted, the human structure would wear out by general decay rather than the giving out of any particular part of the system; but the afflictions to which we all are subject destroy some vital part of our organism, and premature death follows.

Most of the ills which afflict us, and rob us of so much enjoyment, and cause us so much misery and shorten our existence, can easily be avoided with a proper knowledge and observance of hygienic laws.

I. — DISEASE.

Disease, the reverse of ease, is known by comparing it with the standard of health from which it is a departure.

When the fluids of the body are in no respect abnormal, and all the tissue and organs have their normal integrity and properties, and all the functions of the organism are completely and harmoniously performed, perfect health exists; but this perfection of health is but very rarely, if ever, obtained by human beings. We all violate the law of health in some way or other; we abuse or misuse our powers, or we neglect to supply all our actual wants, or we are unable to resist the destructive forces with which we come in contact, and the penalty of a violated law follows as necessarily as an effect follows a cause.

Disease is discord, while health is concord. When either the functions or any part of the structure of the human body is deranged, we are sick. Disease of function is known by its deviation from a physiological standard, while disease of structure is recognized by an anatomical stand-

ard. These varieties of disease are commonly combined. Functional disease is often accompanied and always followed by change of structure, and structural disease without functional disease is rare.

Knowledge of the causes of disease is of paramount importance in its prevention, management, and removal. The causes of disease are very numerous, and are divided into intrinsic or internal, and extrinsic or external, according as they operate on the body from within or without.

Intrinsic or internal causes are the retention of excreta in the system, intense or long-continued emotional excitement, overtaxing the faculties of the mind, etc. Disorders of the nervous system and insanity usually arise from intrinsic or internal causes, such as long-continued mental depression, care, anxiety and worry. Extrinsic or external causes are the action of poisons, venoms, miasmata and injuries.

The causes of disease may again be distinguished as *ordinary* and *special* or *specific*. Ordinary causes are those to which all persons are more or less exposed, as atmospherical vicissitudes, etc. They give rise to two or more forms of disease.

Special or specific causes give rise to only one form of disease, and are extraordinary in their occurrence, as persons are exposed to them only

at certain times or in certain situations. Small-pox, yellow fever, scarlet fever, syphilis, etc., are diseases which arise from special or specific causes.

Causes of disease have also been divided into *primary* and *sccondary*. Secondary causes are those due to the effects of pre-existing diseases. Often when the kidneys are diseased, and their eliminative function interrupted, urea accumulates in the blood and gives rise to various affections. Urea in excess in the blood is thus a secondary cause of disease.

Primary causes do not proceed from prior diseases, and they produce what is called primary diseases; while secondary causes, or those due to pre-existing diseases, produce what is called secondary diseases or complications.

When prescribing for the sick, it is not sufficient to have discovered a disease; we should ascertain whether one or more additional diseases do not exist, and which is the primary and which the secondary disease. To prescribe intelligently, a knowledge of the primary cause is essential.

Probably the most simple division of the causes of disease is into predisposing and exciting. Predisposing causes are a liability or tendency to certain forms of disease. They may be sufficient to give rise to disease, or only suffice to place the system in a condition favorable for its occur-

rence. Exciting causes create disease when acting on persons already predisposed to them.

Predisposing causes of disease are debilitating influences, hereditary constitution, temperament, excitement, age, sex, occupation, climate, and previous and present disease. Among the exciting causes are defective cleanliness, ventilation, and drainage, overwork, excessive worry, mechanical and chemical agents, temperature, sudden changes in the weather, and endemic, epidemic, and contagious poisons.

The symptoms of a disease are the indications of it, and they embrace all the appreciable morbid phenomena occurring in connection with it. A knowledge of the symptoms of disease is essential to a correct diagnosis (the distinction of diseases from one another), and is of the utmost importance in treating the sick. If we have not the knowledge and skill to make a correct discrimination of diseases, to determine their character and seat, we cannot intelligently manage them, or properly treat them.

The prognosis of disease is an opinion as to its future course, changes, and termination. Patients and their friends often desire information concerning the way in which diseases are to end, and it is important to form correct judgment on this point; still, as a general rule, one should avoid making strong statements and confident predictions

regarding the death or the recovery of a patient.

A persor may be very dangerously ill and yet recovery be possible. But to inform such a person of the exact danger at such a time will often take away hope and cut the thread of life. The stimulus of hope helps sustain the feeble patient, and favors the return to health. On the other hand, when a fatal termination of a disease is clearly indicated, and there is no hope whatever of life being long spared, it is a duty to inform the sick man of his danger, that he may be enabled to arrange his worldly affairs, to make his will, and to prepare for death.

We should do everything possible to prevent disease. Many diseases are preventable by removing or obviating their causes. When diseases exist we should devote our attention to their treatment. The division of medicine devoted to the treatment of disease is called therapeutics.

In treating disease by what is called abortive measures, the object is to arrest its progress and restore health by cutting the malady short. Curative, or remedial measures used in treating disease, diminish its severity and danger, and hasten the return to health. Palliative measures are directed to the symptoms or effects of disease rather than to the disease itself, and are frequently employed with the object of temporarily relieving pain or suffering. Sanitary or hygienic measures

relate to pure air, cleanliness, etc. Sustaining or supporting measures consist of tonic remedies and stimulants; and restorative or building-up measures relate to diet and those remedies used to bring the system back to its normal condition.

Diseases may assume different forms and characters to those they originally presented, or they may give rise to other diseases, or they may leave a particular organ and be transferred to some other part by what is termed metastasis; but they all ultimately terminate in health or in death.

The termination of disease in health is due to the subsidence of the morbid actions, and restoration of the vital energy. Convalescence may take place suddenly in some instances, but most frequently the change is gradual. The earliest symptoms favorable to recovery are a diminution of the temperature and pulse, cleaning of the tongue, and a restoration of the secretions to their normal condition.

Convalescence may go on happily or be delayed by unpleasant symptoms, and sometimes the cure is interrupted by a return of the disease — by a relapse. Frequently the symptoms of an acute disease subsides, without disappearing, and continues for a lengthened period; the disease has then become chronic, and may continue until death.

II. — DEATH.

Should a disease end fatally, what will be the mode of death? This is a question frequently asked when diseases involve danger to life, and the following, taken from *Tanner's Clinical Medicine*, will give the reader a full and accurate description of the termination of disease in death:

"Death is the condition to which all organized bodies must ultimately be reduced. It may take place naturally and gradually from old age — from exhaustion of the vital forces, the active powers gradually deserting each organ, the functions of absorption and secretion being arrested, the general circulation becoming slowly suspended, and the heart ceasing to contract. Unfortunately, death from mere old age is very rare."

"Seeing, then, that death from disease or accident is the rule, it behooves us, as guardians of the public health, to do our utmost to remove the causes of disease, and to treat that which is unavoidable with the greatest skill and caution. Death from disease may take place in two ways: either suddenly, the transition from life to death being made in a moment, without warning, or

slowly and gradually, as the termination of some lingering disorder."

"The most frequent causes of these *sudden deaths* are apoplexy; rupture of an aneurism or large bloodvessel into one of the three great cavities of the body; disease of the valves of the heart — the liability to sudden death being greater in disease of the aortic valve than in mitral valvular disease; rupture of the heart from fatty degeneration; clotting of blood in the heart; laceration of the chordæ tendineæ; asphyxia, from obstruction of the glottis, or the bursting of purulent cysts into the air-passages; syncope, from severe shock or alarm; and injury to the head or the spinal cord."

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"Death as it occurs in disease is usually complicated; but in all cases, whether it takes place suddenly or gradually, or whatever may be the malady, it approaches through one of the three vital organs — the brain, the heart, or the lungs. Life being inseparably connected with the circulation of arterial blood, death takes place directly the action of the heart is completely arrested; and since the action of the heart is dependent upon the more or less perfect condition of all the vital organs, which stand in a peculiar reciprocal relation to each other, a cessation of the functions of either of the three speedily arrests

the remaining two. Thus innervation of the muscles of respiration depends upon the medulla oblongata, the energy of the medulla oblongata upon the decarbonization of the blood, and the decarbonization of the blood upon the circulation and respiration. The force of the heart, if not directly, is indirectly connected with the medulla oblongata, because the circulation of the venous blood destroys the irritability of the muscles. And so it results that failure in any one of the three links in the chain is fatal. Hence Bichat spoke correctly of death, beginning at the head, at the heart, and at the lungs."

"We may have, then, First, *Death by Syncope*, that form which is caused by a want of the due supply of blood to the heart. The deaths from flooding after labor, from the bursting of aneurisms, etc., are good examples of this form; on examining the heart afterwards the cavities are found empty, or nearly so, and contracted. Second, *Death by Asthenia*, in which there is no deficiency of the proper stimulus to the heart's action — the blood — but a total failure of the contractile power of this organ. The effects of certain poisons — as hydrocyanic-acid, of strong mental emotion, of lightning, a blow on the pit of the stomach, or the head, etc. — furnish good illustrations of this form. Fatty degeneration and organic disease of the circulatory apparatus in the chest are other causes.

Third, *Death by Apnœa* — or, as we say commonly, by asphyxia or suffocation — is that which occurs when the entrance of air into the lungs is in any way stopped, as in drowning, strangulation, spasmodic closure of the rima glottides, foreign bodies in the air passages. It also happens when a large extent of the lungs is diseased, as in severe pleurisy with effusion, double pneumonia, and also in those cases in which the reflex functions of the medulla oblongata upon which respiration depends are suspended; in those cases death begins in the lungs. The blood being unaerated, continues venous, passes through the pulmonary veins into the left side of the heart, and thence through the arteries to all parts of the body. Venous blood, however, being unable to sustain the functions of the organs to which it is sent, its effect on the brain is at once seen by the convulsions and insensibility which ensue; the blood in the pulmonary capillaries becomes retarded, and gradually stagnates, leaving the lungs and right chambers of the heart full and distended. In what has been called *death by coma*, the mode of dying is really by apnœa."

III. — GENERAL DISEASES.

Morbid States of the Blood. The constituents and properties of the blood, the life of all flesh, or liquid flesh, as it is sometimes called, has been referred to in its appropriate place. As it is through the instrumentality of this vital fluid that the various changes which attend the phenomena of life are accomplished, and as it is the means by which the different organs and tissues of the body are directly nourished, it is of the utmost importance to health and life that it be kept in a state of purity.

The blood is not only a nutrient, but it is the means by which used-up materials are removed from the system; the fluids of the body in addition to the blood consist of various liquids separated or formed from it constituting exhalations, secretions and excretions. The non-excretion and consequent accumulation in the blood of excrementitious substances creates disease and frequently causes death.

Other causes of diseased blood are the introduction into the blood of morbid poisons from without; morbid alteration from processes occur-

ring in the blood itself; and absorption of poisonous material by the bloodvessels from diseased parts of the body.

Certain morbid conditions of the blood are indicated by words ending in æmia. Anæmia, for example, means an impoverishment of the blood; hyperæmia, a plethora or fulness of blood; uræmia, a morbid accumulation of urea in the blood; septicæmia, putrid infection of the blood; and pyæmia, purulent infection of the blood.

Anæmia, a deficiency or poverty of blood, is caused by deprivation of the proper materials necessary for its formation, as wholesome food, pure air, sunlight, etc., and also by exhausting hemorrhages or discharges. Anæmia is also incident to a variety of diseases.

In anæmia the density of the blood is diminished, and there is a deficiency in the number of red blood corpuscles. The chief symptoms consist of a pale, waxy, or a sallow hue of the countenance, feeble, but rapid pulse, nervousness, and diminished energy of mind and body.

A peculiar form of anæmia, technically known as chlorosis, frequently affects young women about the age of puberty. A dark circle appears around the eyes, with ringing in the ears, lowness of spirits and weakness.

Digestion is impaired, and a morbid appetite is sometimes present, as for coal ashes, chalk, earth,

slate pencils, and, in some cases, strong acids.

In the treatment of anæmia, good diet, pure air, and tonic remedies are the essentials.

Hyperæmia, plethora, or fulness of blood, consists of an excess in the density of the blood and in the number of red blood corpuscles; the opposite to anæmia. The face appears full and turgid, with a purplish tinge, the bloodvessels are distended, the pulse strong and full, but rather slow, and there is lassitude, indolence, and a desire for sleep. There is a liability to headache, and attacks of bleeding from the nose.

In the treatment of hyperæmia, or fulness of blood, alcoholic drinks should be avoided, a restricted diet should be adopted, and active exercise should be taken in the open air.

Leucocythæmia is a morbid state of the blood in which the white corpuscles are greatly increased in number, while the red are much diminished. Its symptoms are debility, enlargement of the spleen, lymphatic glands, and frequently the liver. There is an unusual pallor, like that of anæmia, great and progressive emaciation, more or less swelling of the abdomen, and disordered respiration. Diagnosis of the disease, however, is only possible by microscopic examination of the blood. The tendency of leucocythæmia is toward death, and all that can be done is to put off, for a time, the fatal termination. Life may be pro-

longed a few years by hygienic management and tonic remedies, but the disease gradually ends in death.

Uræmia is that condition of the blood in which it contains an excess of material which it is the function of the kidneys to excrete; the action of these organs being suppressed, the excrementitious material is retained in the blood, producing headache, dimness of vision, diarrhœa, convulsions, stupor, and death. The treatment of uræmia must vary with the circumstances of the production of the suppression.

Many diseases involve blood changes; and the morbid conditions of the blood, associated with general or constitutional diseases, will be referred to in connection with a description of the various diseases.

Inflammation. A knowledge of the causes, relations and effects of inflammation may be said to constitute the master-key to the comprehension of the nature of a large number of diseases.

Inflammation is so called in consequence of the acute or burning pain felt in a part affected with it. Every part of the body is liable to inflammation; its recognized symptoms or signs are preternatural redness, swelling, heat and pain.

Inflammation is usually distinguished by particular names, according to the part which is attacked: thus, inflammation of the pleura is called

pleuritis; of the peritoneum, peritonitis; of the stomach, gastritis; and of the liver, hepatitis, etc.

Inflammation of internal organs is detected chiefly by pain, increased by pressure or motion, and by obstruction or alteration of the functional action of the organ.

The causes of inflammation are various. It may be produced by a mechanical or chemical irritant, or by the action of cold, or by some morbid poison received into, or generated within, the system.

Inflammation may be acute or chronic; diffuse or circumscribed; healthy, with a tendency to heal and return to the natural state; or unhealthy, when, on the contrary, there is a tendency to ulceration and gangrene.

The redness of inflammation is caused by the increased flow of blood in the part affected; the swelling is occasioned by dilatation of the vessels and consequent distension of the connective tissue increased by the presence of exuded fluid. Inflammatory swelling can be distinguished from œdema by not pitting upon pressure. The unnatural heat of inflammation is caused by the increased number of red blood corpuscles carrying oxygen in excess to the part affected, which develops an unusual amount of heat; pain is caused by the pressure of the altered tissues upon their nervous filaments.

Inflammation may terminate in one of three ways; in resolution, in suppuration, or in death of the part. When it terminates in resolution, the symptoms subside and the tissues resume their healthy appearance. In suppuration the inflammation goes on, the swelling increases in size, and a fluid called pus, or matter, is formed in the centre of the inflamed tract, which after a time makes its escape through a natural or artificial opening.

Mortification or death of an inflamed part is caused by the inflammatory action being too violent for the vital process. The pain is at first very severe, then the bright red color of the part becomes livid, vesicles form on the surface, the pain abates, and death of the part ensues.

The mode of treatment of inflammation should vary according to the seat and character of the general symptoms, and consists of both local and constitutional remedies.

Boils, Carbuncles, and Styes. Boils, carbuncles and styes are professionally called furuncular inflammations.

A boil or furunculus is a circumscribed hard tumor which usually commences with a small red pimple, very painful and angry looking, and continues to enlarge until it reaches the size of a walnut, with a white point, and a broad, hard, well-defined base spreading under the skin. The

point sinks as the swelling advances until the whole assumes the form of a flat, elevated cake with a puckered centre. Suppuration takes place slowly and imperfectly; the skin ulcerates and allows a little pus streaked with blood to escape; and then in two or three days the core is discharged from the centre. A boil usually runs its course in twelve or fourteen days. Boils may appear on any part of the body, but they most frequently form on the nape of the neck, face, groin, thighs, or in the armpit. Successive crops frequently appear in different situations, to the great annoyance of the patient. Boils are efforts of nature to throw off or relieve the body of some impurity. They are caused by anything which leads to deterioration of the blood. In the treatment of boils it is necessary that the bowels be at first freely opened and then regulated by gentle unirritating laxatives. In some cases alterative medicines may be required. The food should be plain and easily digested. Poultices should be applied to the boil to hasten suppuration. The most ancient poultice that we read of was made of figs, and was applied to a boil when Hezekiah was "sick unto death," and he recovered. Probably as good a poultice as can be obtained may be made of flaxseed meal or ground slippery-elm bark.

A carbuncle may be considered as an aggravated

form of boil. It is usually preceded by loss of appetite, foul tongue, lassitude, headache, general uneasiness and shivering. It commences in the form of a pimple, and as it gradually enlarges, the surrounding skin becomes very sensitive, of a purplish tint, and burning hot; while there is a severe throbbing or dull aching pain in the whole of the affected part. Carbuncles vary in diameter from half an inch to six or seven inches, and are most frequently situated about the nape of the neck or between the shoulders, but they may occur in any part of the body. Men are afflicted with them twice as often as women. They are caused by a vitiated state of the blood. The same treatment should be resorted to as for boils, with anodyne fomentations and such general remedies as the condition of the patient may require.

A sty is a small boil occurring at the edge of the eyelid, and often originating in the follicle of an eyelash. It is met with usually in weakly children and debilitated persons. The treatment consists of the use of warm fomentations with a puncture to assist the exit of a drop or two of pus, if required. Tonics are usually indicated as constitutional remedies.

Hemorrhage. The escape of blood from the vessels in which it is naturally contained, constitutes hemorrhage. The most common cause of

it is external violence by which the bloodvessels of a part are divided. (See "Wounds"). Some persons have what is called a hemorrhagic diathesis; that is, a predisposition to hemorrhage, which is easily produced upon any exciting cause —profuse bleeding usually following the slightest wounds.

Hemorrhage is often important as a symptom, but requires to be interpreted with care. Its effects vary with its quantity and source. Hemorrhage from an artery is a continuous stream of bright red blood which is projected with a force proportioned to the size of the vessel and with a motion corresponding with the pulsations of the heart; from a vein the blood is of a dark crimson color and the flow is continuous and equable, with less force than from an artery; from the capillaries the blood flows with a more or less rapid oozing, but is not projected to any distance from the body.

There may be profuse bleeding, as when it occurs into one of the cavities of the body, without external loss of blood; this constitutes internal or concealed hemorrhage. The constitutional effects of hemorrhage are the same in kind, though differing in intensity, whether the bleeding proceeds from arteries or veins, and whether the hemorrhage be apparent or concealed.

When hemorrhage is profuse the face becomes

pale, the pulse small and rapid, the patient feels languid, the respiration assumes a sighing character, the senses of sight and hearing are perverted, the temples throb, the skin becomes cold, and at last, rather suddenly, the patient faints; the heart's action is then very feeble, and the blood coagulates about the wound, and thus stops the bleeding. When consciousness returns the increased action of the heart may force away the clot, and the blood flows afresh; and the patient if not attended to may die.

When a large artery is cut the bleeding is so excessive as to cause almost instant death; but with arteries of small size, and veins, the flow of blood although at first rapid, soon ceases after exposure to the air, which contracts the orifice of the vessels, and coagulates the blood.

When endeavoring to control hemorrhages of any kind the patient's mind and body should be kept as quiet as possible, and the position of the body should be such that the flow of blood to the bleeding part will be impeded. The wound or injured part should be bathed with cold water, and the bleeding, if slight, may be stopped by the application of ice or pressure. Hemorrhage from parts not easily subjected to pressure may be controlled by applying some of the various styptics, as the solution of subsulphate of iron, tannic acid, alum, etc.

When hemorrhage is profuse, the blood coming out of an artery in jets at each beat of the heart, a surgeon should be immediately sent for to ligate the injured vessel. The ligature as now used is the best method of checking arterial hemorrhage. While awaiting the arrival of the surgeon, the hemorrhage may be temporarily controlled by means of pressure. If the hemorrhage is from an artery in the arm or leg, a handkerchief may be tied around the limb between the wound and the heart; by running a stick beneath the knot and twisting it up the requisite pressure may be attained. The injured person should avoid the use of stimulants, as they tend to increase the bleeding.

Bleeding from the nose, or epistaxis, as it is called, is most frequent during childhood and early adolescence. It is seldom alarming in youth, unless it comes on during the progress of some disease; but in advanced life, bleeding at the nose gives rise to much anxiety. It may result from mechanical injury, congestion of the lining membrane of the nose, congestion of the brain, typhoid fever, hemorrhagic diathesis, or suppressed menstruation. Care must be taken to discriminate between those cases where interference is necessary and where it is not. Should it be necessary to arrest the bleeding, a simple remedy is to place a small roll of paper or muslin above the front

teeth under the upper lip, and by pressing hard upon it, the passage of blood through the arteries leading to the nose will be checked, and the bleeding arrested. The patient should sit upright in a cool apartment, and benefit is often derived by holding one or both arms above the head for a short time. Should these remedies fail, a towel wet with ice-water may be applied to the neck and back, which often by reflex action will check the discharge; or ice can be applied directly to the nose and forehead. External compression of the nostril with the fingers sometimes succeeds by favoring the formation of a clot. In urgent cases the nostrils may be swabbed with the solution of subsulphate of iron or other styptics.

Hemorrhages from the lungs, bowels, etc., will be referred to in connection with the diseases with which they are associated.

Scrofula. The word scrofula is used to designate a blood disease which may result either in the formation of tubercle or in some specific form of inflammation or ulceration. Scrofula with tubercle and scrofula without tubercle, are the two varieties of the disease. At the root of these varieties of one widely prevalent disease is a condition of system spoken of as the scrofulous strumous or tuberculous diathesis.

The causes of scrofula are hereditary influence,

syphilis, debauchery, bad air, improper food, and a cold, damp atmosphere.

"So slowly is scrofula developed," says Professor Dickson, "that I do not believe that it is ever developed in one generation; I believe that preparation is made in one generation, and the development is completed in another; the fathers eat the sour grapes and the teeth of their children are set on edge."

Scrofula with tubercle more frequently affects the lungs than any other internal part. Numerous small tubercles form in these organs, and remain in a latent state during a longer or shorter period, gradually increasing in size, and at last soften, and cause incurable consumption. Consumption, however, is not necessarily connected with the formation of tubercle. The consolidation and softening of the lungs are often tubercular, yet may also be the result of some form of inflammation and condensation, as chronic pneumonia, etc., of the pulmonary structure.

Scrofula without tubercle or external scrofula manifests itself chiefly by glandular swellings, more or less extensive, ulcerations and indolent abscesses. One of the most frequent results of this variety of scrofula is inflammation of the lymphatic glands, especially those about the neck and lower jaw. Children are afflicted with this manifestation of scrofula more frequently than

adults. Scrofulous children are also frequently afflicted with sore eyes which require careful attention.

In scrofulous ulcers extensive tracts of skin may be destroyed: and the efforts at repair are always slow and imperfect. Strumous abscesses often commence insidiously, and are apt to become indolent or suppurate imperfectly or burrow deeply in all directions.

The only hope of cure a scrofulous subject has, lies in constitutional treatment; without which, the general health gradually deteriorates. The faulty nutrition must be improved, so as to promote the formation of healthy blood. If tubercle has formed we must endeavor to favor its absorption and to prevent its formation in the future. The patient should have a plain but generous and nourishing diet, plenty of sleep and exercise in the open air, and should not be allowed to breathe air that is in the slightest degree impure. Cleanliness should be given important consideration; bathing the entire body in water of a suitable temperature three or four times a week is advisable, as it will maintain the functions of the skin and improve the general health. Sea bathing and sea air are especially beneficial. Flannels should be worn next to the skin throughout the year, and the clothing should be such as will protect the body from changes in temperature. Excesses

of all kinds and everything that tends to weaken the body and debilitate the system, should be avoided; and the patient should lead a life of moderation and temperance.

In addition to an observance of these general suggestions, medicines, as a rule, are essential. Iodine -in different forms is often prescribed, but no one prescription can apply to all. Each case must be considered by itself, and such remedies both internal and external, should be given as the system demands and are best adapted to supply its wants.

To prevent the transmission of scrofula is of the utmost importance. Doctor Tanner (not the faster, but an eminent English author) in speaking of scrofula with tubercle says: "Remembering what has been said upon the hereditary nature of tuberculosis it should be noticed that there are three points to be particularly attended to in order to prevent its transmission. These are: 1. To obtain well assorted marriages — the marriages of parties in sound health and vigor, and not related by blood to each other. 2. Where this disease exists in the parents, or in either of them, great care must be taken to maintain the health of the mother during the period of utero-gestation. She should wear warm clothing, take regular exercise in the open air, avoid heated rooms and late hours, sleep in a

large room, and have a plain and nourishing diet. 3. On the birth of the child, every means ought to be taken to strengthen its general health, and to counteract the hereditary influence by attention to the food, air, clothing, etc. If the mother be free from the strumous habit, she may suckle her offspring, but otherwise a young and healthy nurse should do so. At the age of nine or ten months the infant ought to be weaned and fed on cow's or goat's milk, a small quantity of light nutritious vegetables, and a little good broth. Doctor Paris strongly recommended milk impregnated with the fat of mutton suet, which he ordered to be prepared by inclosing the suet in a muslin bag, and then simmering it with the milk. The child must be clothed in flannel; should live in apartments which are well ventilated and well lighted; ought to have plenty of exercise in the open air; and once daily should have a cold sea-water bath, or a tepid bath with bay salt dissolved in it. Ill-arranged, badly drained, close-smelling, damp houses must be avoided, as well as all those localities which are generally regarded as unhealthy."

Caries of the Spine. Caries is an unhealthy ulceration of bone, accompanied with a low form of inflammation. Caries of the spine is often met with in scrofulous children between ten and fifteen years of age. It commences with inflamma-

tion, usually attended with dull aching pain and weakness in the diseased part. Generally the bodies of several vertebræ are simultaneously affected; they become softened and disintegrated, and lead to disorganization of the intervertebral fibro-cartilages.

The curvature of the spine and consequent deformity which is characteristic of the fully developed affection is caused by a crumbling or breaking down of the affected bones under the superincumbent weight of the head and upper part of the body. An abscess forms, which, if not arrested, makes its way to the surface frequently some distance from the seat of the disease, and discharges a fluid often containing particles of bone.

Caries of the spine can be prevented by obedience to the laws of health. In its treatment, rest of the part and attention to the general health is of the utmost importance. The wearing of a supporting apparatus that will permanently remove all weight from the inflamed bones, counter irritation along the spine, nutritious food and the use of cod liver oil, iodide of iron, and the phosphates, frequently result in complete cures.

Coxalgia or Hip Disease. Coxalgia or hip disease is a dreaded malady that is met with in persons under fifteen years of age, and occasionally in those who are

older. More boys are affected with it than girls. Some surgeons regard it as a disease like spinal caries — that is, a constitutional affection depending upon a scrofulous diathesis; others look upon it as having a local origin and specially demanding local treatment. Probably both views are correct; the disease may be due to either local or constitutional causes. Its exciting causes are in most cases of an apparently trivial character, as slight blows, falls, sprains, over-exertion in walking, or sitting on cold stones or in damp places.

Hip disease usually commences insidiously. There is eversion of the foot with apparent elongation of the leg; slight pain in the knee which is usually bent, and the child walks with a limping or shuffling gait, treading only on the toes of the affected limb. The obscure pains at first are often considered rheumatic, but examining the hip joint, it is found that pressing the head of the thigh bone into it gives pain. As the disease advances, the foot usually becomes inverted, the leg shortened, and the thigh partially flexed. Anchylosis may then occur in the hip and a cure effected, or a carious condition set in with destruction of the acetabulum, formation of abscesses and death following. It is important that the treatment should begin early in this disease, and it requires time, patience and skill. It consists of perfect rest, the use of mechanical appliances, and such remedies as the condition of the patient may demand.

Rickets, or Rachitis. Rickets or rachitis is a constitutional disease occurring almost exclusively in childhood. It is characterized by softening of the bones and consequent alteration from their natural shape. The weight of the body bends the unnaturally soft bones of the legs, and the child thus becomes "bow legged." The bones of the skull instead of becoming united, separate from each other, and the head becomes enlarged. The teeth are slow in appearing, and decay prematurely. The abdomen is prominent, the body lean, and there is indigestion and general debility.

The tendency to rickets may be inherited, but the disease is usually acquired. It often results from mal-nutrition, caused by insufficient and especially improper food; or from other sources of constitutional depression, as a residence in damp, dark, cold, or filthy dwellings; the respiration of foul, impure air, etc.

Children may be predisposed to rickets when their parents have married too early or too late in life, or have weakened themselves by sexual excesses. The children of parents whose constitutions have been impaired by drunkenness, by syphilis, by scrofula, or by unhealthy occupations, and the offspring of delicate anæmic mothers are also predisposed to this disease. Rickets itself is not hereditary, but the tendency to it is, and when exciting causes are brought into action, the

disease is more easily developed in children who are predisposed than in those who are not.

The treatment of rickets consists chiefly of hygienic measures. Fresh air, proper food, suitable clothing, exercise and cleanliness are of paramount importance. Sea-water baths are beneficial; and a residence by the seashore or in the country is preferable to the city. Lime-water, cod liver oil, and various preparations of iron, lime, and soda, have their value as remedies when properly administered.

To prevent the occurrence of rickets in delicate children, or in those who have inherited a tendency to the disease, the treatment must commence at birth. The infant should be fed only at the breast during the first eight months of life; if the mother is weak and sickly, a strong and healthy wet nurse must be procured. As the infant grows older its diet must be governed by its age.

Syphilis. Syphilis, a venereal disease, may be inherited or acquired. Acquired syphilis can only arise from contagion; from the introduction of a peculiar animal poison into the system. It yields a specific pus which by contact with an abraded or tender surface is capable of extending the affection. Probably no poison has a more powerful yet insidious influence in deteriorating the constitution than the syphilitic.

The phenomena of acquired syphilis has been

divided into the primary, secondary and tertiary stages. The primary symptoms are due to the application of the poison, or to inocculation. They consist of a specific sore called a chancre, followed by an inflammatory swelling of a lymphatic gland, usually in the groin, called a bubo. There are two kinds of specific sores, or chancres — soft and hard — and a period of incubation, varying from one to seven weeks, intervenes between exposure to contagion and the appearance of the chancre. The soft chancre is superficial, and is more common than the hard chancre; the latter differs from it in possessing an indurated base, and in being elevated above the skin. The soft chancre, or chancroid, as it is termed, may form a bubo, but it is claimed that it has no power of contaminating the system, while the hard or true chancre seldom forms a bubo, but yields to the system the syphilitic virus. It is usually several weeks after the appearance of the primary symptoms of syphilis before the secondary symptoms present themselves. They are peculiar copper colored eruptions on the body, sore throat, mucous patches, enlargement of lymphatic glands, and slight loss of hair. After the subsidence of these symptoms, there is usually an interval of indefinite length before the development of the tertiary symptoms, which may affect almost any tissue or organ of the body The skin, mucous membranes,

eyes, solid viscera, nervous system, areolar tissue, muscular and fibrous tissue and bones and periosteum present appearances of the destructive work of the loathsome disease.

The treatment of syphilis is local and constitutional. The local treatment consists in promptly cauterizing the chancre and thus destroying the virus before it passes into the blood and contaminates the system. Nitric acid is the caustic preferred; it is one of the most effectual. One or two drops of it may be applied to the chancre from the point of a small sliver of wood. After the application the part should be washed with castile soap and water and dressed with a simple ointment and it will soon heal. A bubo may be treated in its early stages by the application of tincture of iodide and compression, but when it is far advanced its treatment depends upon its condition.

When syphilis has contaminated the system, constitutional remedies should be employed, but care must be taken in their selection and administration. Carelessness or neglect in treating this disease has often resulted in a life of suffering and remorse. The patient should consult at once a skilful and conscientious physician, for the condition of each case must be taken into consideration before the remedies best adapted to effect a cure can be prescribed.

Rheumatism. Rheumatism is one of the most common, painful, and annoying diseases with which Americans are afflicted. It appears under two distinct forms, the acute and chronic. Acute articular rheumatism, as the name implies, involves an affection of the articulations or joints. It is characterized by fever, profuse acid sweats, and inflammation of the fibrous tissues, surrounding one or more of the joints. The local phenomena are pain, tenderness, increased heat, swelling, and redness of the skin.

Acute articular rheumatism, in most cases, commences with a sudden attack, which is usually occasioned by exposing the body to cold or dampness immediately after having been heated or fatigued. Cold and dampness, however, act only as exciting causes, and will not alone produce rheumatism; a special predisposition, or a rheumatic diathesis, as it is termed, which may be inherited or acquired, is necessary to its development. A poison circulating in the blood constitutes the predisposition, and cold and dampness by checking the elimination through the skin and other emunctories of the poisonous principle as it forms, and by thus accumulating it in the blood, causes the disease.

The earliest symptoms of acute rheumatism are chilliness and shivering, followed by restlessness, fever, and at the end of twenty-four or thirty-

six hours, by stiffness, with aching pain in the limbs or joints. The pain quickly increases, soon accompanied by swelling, which is most apparent in joints not covered with muscles, as the knee, wrist, elbow, ankle, and the smaller joints of the hands and feet. Pain is especially excited by pressure over the joints, or movement of the affected part, and in severe cases, the slightest motion is attended with suffering of the most agonizing character. The pain is not so intense when the affected parts are perfectly quiet, and the sufferer is obliged to maintain as long as possible a fixed position.

The patient is a pitiable object of helpless suffering. He is very restless, with a pulse full and bounding, face flushed, hot and moist, the body usually bathed in perspiration of a disagreeable sour odor, thirst intense, bowels constipated, urine scanty and high colored; but the disease seldom if ever ends fatally, except when it attacks some vital organ, as the heart.

Rheumatism has a tendency to move from one part to another; it may suddenly leave one joint and appear in another, and then perhaps in a third, or it may return to its original seat. The most serious change is in severe cases, when it may attack the membranes of the heart. An attack of acute rheumatism under various modes of treatment has averaged about three weeks.

Chronic rheumatism may be the sequel of acute rheumatism, but it more frequently comes on gradually, independent of an acute attack. It is common among old people in the decline of life. In whatever part of the body fibrous tissues are found, there may be rheumatism. When it complicates, or follows a venereal disease, it is called venereal rheumatism. In chronic rheumatism there may be only slight constitutional disturbance at first, but the sufferer is constantly annoyed, and after a while his existence is made miserable by wearying pains which destroy his comfort during the day, and cause him to be restless at night.

A disordered state of the digestive organs sometimes brings on paroxysms of the disease known as rheumatism.

In rheumatism of an erratic kind, dependent on exposure to cold, dampness, etc., warmth affords great relief; but in rheumatism due to a derangement of the digestive organs and secretions, and in venereal rheumatism when the blood is circulating a poisonous material through the system, the pains are aggravated by warmth. Rheumatism occasionally cripples some of the smaller joints, especially those of the fingers; the knuckles become knobby, and the form and position of the fingers distorted.

The treatment of rheumatism requires time,

patience, common sense, and skill. The cure of the chronic form of the disease is tedious and often very difficult. Probably there is no other disease for which so many different remedies have been used, or in which there has been such variations in the mode of treatment. Success in the treatment of either the acute or chronic form of the disease is dependent upon keeping the secreting organs in a state of healthy activity, and in protecting the patient from the vicissitudes of the weather. The medicines used must vary with many circumstances.

In the treatment of acute articular rheumatism during the past few years, salicylic acid and its compounds have been used quite extensively; they probably have no anti-rheumatic virtues but relieve the disease merely by repressing two of its symptoms very much as quinnia and aconite, and veratrum and opium may do. The bicarbonate of sodium probably approaches nearer the character of a true remedy. The National Dispensatory speaks of it as follows: "In acute articular rheumatism, and notably in those cases of it in which many joints are involved, and in which there is high fever, acid sweats, and loaded urine, the bicarbonate of sodium is of inestimable benefit, provided that it be given so as to maintain a neutral condition of the urine. Its efficacy is increased when the affected joints are swathed

in compresses saturated with a solution of the salt."

The abnormal condition of the blood and excretions in acute rheumatism may be corrected by the alkalies and their salts; the alkaline treatment, as it is called, being considered the best by most authorities. A refreshing saline drink, or lemonade, is beneficial during the early stages of the disease, especially when there is much thirst. Relief from pain is often obtained by wrapping the affected joints in cotton wool and oiled silk, by which a sort of local vapor bath is formed.

Chronic rheumatism requires different treatment from that of the acute. There are several special remedies which give relief; the best remedy to use varies with each case. Iodide of potassium is valuable in many cases; if the secretions are acid, bicarbonate of potash may be combined with it. Warm bathing, vapor, hot air, or hot water baths, either plain or alkaline, or medicated with sulphur, are often of great service when the pains are severe. During the interval of the pains, tepid salt water baths may be employed with frequent friction with a coarse towel or flesh-brush. There are various anodyne applications that will give temporary relief from the pain. The officinal liniment of aconite, or ammonia, or camphor, may be used, together with such internal remedies as the condition of the patient may require. All

sufferers from rheumatism should wear flannel next to the skin, and those who can afford it, do well by removing from those localities where the atmosphere is not conducive to their health, and taking up their residence in a more congenial climate.

Gout. Gout is a disease that may be defined as a specific inflammation, having a constitutional origin, and favored by an hereditary taint. Its exciting causes are indolent habits, the intemperate use of wine, and over-indulgence in the pleasures of the table; everything, in fact, which, by inducing mal-assimilation of the food, leads to the formation of an excess of uric acid in the blood is an important cause.

Excess of food, by supplying excess of nitrogenous materials for the blood, tends ultimately to produce excess of urea and uric acid which have to be expelled by the kidneys. These organs perform their function properly for a while, but the excessive work thrown upon them ultimately causes them to act imperfectly, and there is consequent retention of certain materials in the blood which produces gout.

An acute attack of gout may be preceded by premonitory symptoms, or it will come on suddenly. The spring is the season in which the disease is most apt to occur, while the autumn ranks next; probably owing to the variableness of the weather at these times. An individual is usually between

thirty and forty years of age when the first attack is experienced, and although the disease may come on without warning, it is frequently preceded two or three days by a disordered state of the digestive system.

The first paroxysm generally declares itself about two or three o'clock in the morning, with a burning and throbbing pain in the ball of the great toe, or in the heel, or the fascia covering the instep of the foot, or the thumb. The chief seat of the disease, however, is usually in the first joint of the great toe. The affected part becomes red, swollen, and exquisitely tender to the slightest touch; the pain resembling that of a dislocated bone, and attended with the sensation as if cold water was poured over the part. The sufferer may feel chilly and afterwards feverish, restless, very irritable and mentally depressed; his tongue is white and thickly furred, bowels constipated, and urine scanty, acid, and high colored. The pain although most excruciating, usually abates towards dawn. and the patient may fall asleep.

On the second night the pain again becomes aggravated, and perhaps also on the third. What is known as "a fit of the gout," usually passes off in a few days, but it may extend over a period of several weeks, after which the person feels much better both in mind and body than before the attack.

With improved strength and spirits the victim forgets that the disease will return, and pays but little or no attention to hygienic laws. Perhaps a happy interval of one, two, or three years may elapse before the second attack, but with each paroxysm the interval is shortened and the disease becomes more severe and the attack of longer duration, until at length the attacks are almost constant; the disease has then become chronic.

An attack of gout confines itself to a single joint at the commencement, but as the disease progresses, several joints in both feet or in the hands suffer, and the constitutional derangement becomes more marked and constant. Deposits of a material resembling moist chalk are formed around and outside the affected joints.

Gout and rheumatism are frequently present together; they become mixed and produce a hybrid disease called rheumatic gout. Irregular or misplaced gout is that form of the disease which instead of attacking the joints causes an inflammatory affection of some of the internal parts.

The most efficient way to cure gout is to pay strict attention to the diet, to avoid the use of alcoholic drinks, and to take plenty of active exercise in the open air. Starving the disease will not cure it; care must be taken that the quantity and quality of the food consumed is such as will

supply the wants of the system and no more. The secreting organs must be kept in a state of healthy activity. Mild laxatives, diuretics and diaphoretics often afford great relief.

Colchicum has long been regarded as a specific for the gouty paroxysm; it should be given in small doses at regular intervals, either alone or with alkalies or iodide potassium.

Dropsy. Dropsy may be defined as an accumulation of watery fluid in one or more shut cavities of the body, or in the areola tissues, or in both. It is an important symptom or sequence of other disorders, and is rarely a disease itself. It may be caused by obstruction to the circulation of venous blood, or by the arrest of excretion and absorption, or by an excess of water in the blood. Disease of the heart or of the liver brings on dropsy by venous obstruction; disease of the kidneys or the action of cold and wet upon the skin may produce it by checking excretion; and wasting diseases are liable to it in their advanced stages, on account of the watery state of the blood.

The capillaries which ramify every part of the body constantly pour out upon every surface, in a state of health, a watery fluid to moisten the parts and thereby facilitate motion and prevent injury from friction. This watery fluid is speedily taken up by another set of vessels called the absorbents, which carry it back to the general

circulation. When the two processes of exhalation and absorption are properly balanced, the surfaces will merely be kept moist; but when the balance from some cause or other is disturbed, as when exhalation takes place more rapidly from the surfaces of one of the shut sacs, or absorption more slowly than in health; or when the power of absorption ceases while exhalation is going on, then, under either of these circumstances, dropsy must result.

When dropsies arise from defective absorption they are called chronic or passive dropsies; when from excessive exhalation of serous fluid, active or acute. Those due to disease of the heart or kidneys, slowly producing some alteration in the blood, with obstruction to the circulation, are usually of the first kind; those caused by cold, by sudden checking of the urine or perspiration, by the poison of scarlatina, etc., of the second.

Dropsy is distinguished by particular names, according to the part in which it is met with; thus: when in the head it is called hydrocephalus; in the chest, hydrothorax; in the belly, ascitis, and in the areolar tissue generally throughout the body, anasarca. When the connective tissue of only one region becomes dropsical it is said to be œdematous.

In the treatment of dropsy the first object is to get rid of the preternatural accumulation of

watery fluid; this may be accomplished by the use of diruetics, purgatives and diaphoretics, or by the mechanical removal of the fluid by tapping and acupuncture: at the same time it is necessary to maintain the general nutrition of the system. The second object is to prevent dropsy in the future, which will be referred to in speaking of the different disorders of which it is the consequence.

Hydrophobia. Hydrophobia is a terrible disease that arises from a morbid poison introduced into the system by the bite of a mad dog, or other rabid animal. It is called hydrophobia from the great dread that those who suffer from it manifest at the sight of water; it gives rise to horrible suffering, and the genuine disease is almost universally fatal.

After a person has been bitten and the poison received into the body, the wound heals in the ordinary way, but the poison slowly affects certain changes in the system, increases in quantity and virulence, and at an indefinite period, exceeding thirty days, symptoms of the disease begin to manifest themselves. All persons bitten by a mad dog or other rabid animal are not attacked by hydrophobia, which is accounted for by the fact that the saliva is often wiped from the teeth of the animal as they pass through the clothes. It has been thought by some that hydrophobia is some-

times due to the mental anxiety that a person undergoes from the consciousness of his danger, but this is not true. Extreme anxiety may derange the nervous system, or cause an imaginary disease, but it can no more produce hydrophobia than it can small-pox, scarlet fever or syphilis. If a farmer wishes to raise a crop of corn, the seed must be planted; no other seed but corn will produce corn; so with hydrophobia. If the particular poison necessary to produce the disease has been introduced into the system, the disease will result; otherwise it cannot be produced.

Unfortunately, when a person has been bitten by a rabid animal he has no means of knowing whether the poison necessary to produce disease has been introduced into his system or not, and he naturally worries. Even though his system be free from the poison, he has no positive evidence of it, and through mere anxiety alone, serious sickness and death may result.

The precursory symptoms of genuine hydrophobia are mental uneasiness, chilliness, languor, lassitude, restlessness, loss of appetite, and more or less headache, with usually a painful, red, and swollen condition of the part previously bitten. These symptoms may last one, two, or three days, when the confirmed, or hydrophobic stage of the disease commences with irritability, garrulity, peculiar rapid movements of the eyes, frequent sigh-

ing, nausea and fever; the sufferer soon experiences pain and stiffness about the neck and throat, with difficulty of breathing and swallowing, a horror of liquids, a frightful sense of suffocation and terrible anxiety. The thirst is intense, yet the sufferer dare not or cannot drink, for every attempt to swallow fluids brings on distressing paroxysms of choking and sobbing; and even any sudden impression, as of sound, a flash of light or a current of air passing over the face, brings on spasmodic gasping. The symptoms rapidly increase in severity until the nervous irritability ends in violent delirum, with exhaustion, or coma and death. It is usually two or three days from the commencement of the confirmed stage before death takes place, but it may not occur until the sixth.

The treatment of hydrophobia must be directed to its prevention, for after the disease has become fully developed it is difficult and almost impossible to cure. The only sure way to prevent it is, immediately after being bit to cut out every part of the flesh which the animal's teeth may have touched. This, though harsh treatment, is effectual. While awaiting it, forcible suction will aid in removing the poison, and ligature with any kind of a bandage above the part will retard the absorption of it. After excision the wound should be thoroughly washed by a stream of tepid water poured over it; lunar caustic may also be applied. To

aid the elimination of any poison which may have absorbed before the use of the knife, a course of Turkish baths may be taken. When excision cannot be safely performed, free application of lunar caustic, or of a red hot iron is the next best thing. Excision and cauterization will lessen the danger of the horrible disease, even when it cannot be performed until the next day. In treating the disease itself, hypodermic injections of atropia or morphia, hot air baths, or the inhalation of anæsthetics, often afford great relief.

Cancer. A cancer, commonly called a malignant tumor, but professionally called carcinoma, is a local manifestation of a specific disease of the blood. It may attack almost any part of the body, but the organs most frequently attacked are the breasts in females, and the lower lip in males. It is not half as fatal in the latter as in the former.

There are two principal varieties of the disease; viz.: scirrhus, or hard cancer, and medullary, or soft cancer. There are several sub-varieties of which it is unnecessary to speak.

A cancer has a tendency to infiltrate neighboring tissues, to affect lymphatic glands, to soften and ulcerate, to recur after removal and to be followed by secondary deposits.

The disease seldom occurs under twenty-five years of age, and a peculiarity of it is that the younger the person when attacked the more

rapid its progress; in early youth the tendency of a cancer is to increase constantly and rapidly until life is destroyed, while in advanced age it may remain in a state of torpidity for years.

Cancer causes death either by hemorrhage or by mechanical interference with vital organs, or by general infection of the blood. Those afflicted with it should be placed in the best possible hygienic conditions, so that their constitutional powers may be kept up to as near the standard of health as the disease will allow. Tonics, nourishing food, pure air, warm clothing, cleanliness and cheerful mental occupation are important. The pain, if excessive, may be prevented or relieved by the judicious use of anodynes. The prognosis of cancer especially when not properly cared for is unfavorable, and as its course in its fatal career is frequently rapid, those afflicted with the disease should seek medical advice early.

IV. — FEVERS.

Fevers are caused by the action of a poison on the blood, and through this on every tissue of the body; they thus affect the entire system. Their development usually is attended by a chill or chilliness, and they are characterized by an accelerated pulse, increased heat of the whole body, dryness of the skin, mouth hot and dry, preternatural thirst, scantiness of urine, impaired functions, muscular debility, diminished appetite and strength, frontal headache, pain in the loins and limbs, restlessness, disturbed sleep, and often nausea and vomiting.

Fevers usually increase in violence in the evening; and they may be divided into five classes; viz.: continued fevers, intermittent fever or ague, remittent fever, yellow fever, and eruptive fevers.

Fevers are called continued when they pursue their course without any well-marked remissions. This class includes five varieties; viz.: simple continued fever, typhus fever, typhoid fever, cerebro-spinal fever and relapsing fever.

Simple Continued Fever. Simple continued fever, when uncomplicated, is a mild disease, seldom

attended with any danger; it has a variable duration of from one to ten days. It usually commences without warning; the patient being suddenly seized with lassitude, disinclination for bodily or mental exertion, loss of appetite, and frontal headache. Irregular, chilly sensations may accompany the attack, the skin becomes hot and dry, bowels constipated, and urine scanty and high colored. These symptoms may continue a few days, when the disease usually terminates in profuse perspiration, leaving the patient languid and exhausted. Convalescence usually is rapid. Hygienic and palliative measures only, are called for in the treatment of this disease, in cold or temperate climates. The remedies indicated are a saline laxative, refrigerants, and perhaps anodynes.

Typhus Fever. The prevalence of typhus fever in this country is comparatively limited, although the disease has been known from the earliest antiquity. A predisposition to it may be engendered by all those influences that depress the mind and body; but its exciting cause is the effluvia from human bodies accumulated in filthy towns, unventilated and crowded houses, ships, jails and camps. It is contagious and infectious, and often prevails epidemically. Intemperance, improper or insufficient food, great fatigue and excessive mental anxiety, prevent the system from resisting the contagion.

After the fever poison has been received into the system, there is usually a period of incubation, during which slight chilliness, nausea, loss of appetite, thirst, headache, pain in the back and weakness occur. The duration of this precursory stage varies, but it is usually only a few days, after which a cold stage of variable distinctness begins the attack. Fever quickly follows, with severe headache, whitish or yellowish tongue, and great irritability and restlessness towards evening. The patient is rather wakeful at night, but lies in a stupid condition during the day, occasionally muttering to himself. He is easily aroused, but soon falls into a half sleep again. The senses of taste, smell and hearing, are impaired in most cases, and the face assumes a dusky flush of redness. As the disease progresses, the pulse becomes more frequent, weaker and compressible, and the tongue grows darker, becoming brown, sometimes black, and often cracked or fissured. Costiveness, with scanty urine, is the general rule. From the fourth to the seventh days from the commencement of the fever, the mulberry typhus rash appears on the abdomen, chest, and upper part of the limbs. It consists of irregular spots of a dusky or mulberry hue, disappearing on pressure, and feeling as if slightly raised above the skin; their number and depth of color vary in proportion to the severity of the attack.

During the second week the patient becomes much weaker, voice more feeble, and there is deficiency of sensation, and insensibility to impressions. Delirium usually occurs at the end of the first week, and sometimes, especially about the 9th 10th, or 11th day, there is profound somnolence, which may end in fatal coma. This is the critical period after which a decline of the disease may be looked for.

The danger of the fever is increased when it is complicated by disease of the lungs; among the unfavorable symptoms are extreme prostration, hiccough, a brown, hard, tremulous tongue, muscular tremor, abundant eruption and persistent sleeplessness with delirium. The duration of an attack is usually about three weeks; but when the disease proves fatal, death usually occurs between the 12th and 20th day.

The lower classes of society are afflicted with typhus fever more frequently than the upper, as may be inferred from the nature of its origin. To prevent the generation of the typhus poison, wholesome food, an abundance of pure air, and an observance of the laws of health are essential.

The most important part of the treatment of the disease consists of hygienic and supporting measures. Perfect quiet, careful nursing, plenty of fresh air, attention to the diet, cleanliness and the use of disinfectants are of paramount import-

ance. Concentrated liquid food — beef tea, chicken or mutton broth, raw eggs, milk, etc., — and if the powers of life begin to fail, give such quantity of the best brandy or whiskey as may be required. Barley water acidulated with lemon juice may be used as a drink. Cooling applications may be made to the head when necessary, and the body may be cleansed by bathing with tepid water. A mild laxative should be given at the commencement of the disease, but as it progresses constipation usually is best relieved by an injection of warm soapsuds. To meet the difficulties of the case as they arise, and to guide the disease to a favorable termination, is the grand desideratum; and in addition to the general plan of treatment suggested, such medicines may be used as the condition of the patient may demand.

Typhoid Fever. Typhoid fever resembles typhus in its main features, and until about the year 1840, they were generally regarded as merely two stages of the same affection; but they are essentially distinct diseases — as distinct as small-pox and measles.

Typhoid fever is more gradual in its approach than any other fever, and usually in its early stages there is slight bleeding at the nose, and a bronchial cough, which symptoms do not occur in typhus. The countenance is purplish red in typhoid, and dusky red in typhus. Diarrhœa is

almost always present in typhoid (often accompanied with hemorrhage), while constipation is the rule in typhus. The eruption in typhoid consists of rose-colored spots thinly scattered, and often entirely absent; they appear between the seventh and fourteenth day, and soon disappear; while the mulberry rash of typhus comes out between the fourth and seventh day and lasts until the termination of the disease, giving the skin a dusky and mottled appearance. In typhoid, the pulse and temperature rise and fall independently of each other, though both generally remain high to the fifteenth day; while in typhus the pulse and temperature rise steadily (the pulse to about 120 and temperature to 105°) until about the third day, when they remain stationary for a few days, and then begin to fall about the ninth day. In typhoid the evening temperature is higher than the morning; in typhus it is the reverse. Typhoid rarely attacks persons after forty years of age, but typhus may occur at any age. Relapses occasionally occur in typhoid, but not in typhus. In typhoid the duration of the symptoms is seldom less than twenty-two to thirty days; in typhus it is from fourteen to twenty-one days.

Typhoid fever is most prevalent in autumn; it is an endemic, slightly infectious disease generated by putrefying animal matter. Frequent sources of the disease are impure drinking-water, and the efflu-

via from foul drains. After the poison has been received into the system, there is a period of incubation, which varies from ten to fourteen days; then the disease sets in slowly and insidiously.

The patient experiences a sense of anxiety, with fatigue and aching about the body; in the course of a few days he has chills, headache, intolerance of light, loss of appetite, intense thirst, and his tongue becomes coated with a creamy fur, but red at the tip. The patient may now take to bed with fever of considerable violence, and his face acquires a dark purple flush. About the end of the first week swelling of the belly and diarrhœa come on; watery passages are characteristic of this disease. The patient lies dozing, perhaps muttering, unless disturbed, all day; but is more or less wakeful and delirious at night.

The increase in the temperature of the body from the normal degree (98.5°) is gradual during the first four or five days; reaching 104° on the evening of the latter. An attack of disease in which on the second day the heat in the axilla is as high as 104°, is not typhoid fever; neither is a disease typhoid fever in which the temperature falls below 103° from the fourth to the eleventh day. There is a difference of one or two between the morning and evening temperature of the body in typhoid fever; the greatest heat being in the evening.

The most unfavorable symptoms are persistent diarrhœa with hemorrhage, a very rapid pulse with great heat of skin, and continuous delirium with muscular twitchings.

Typhoid fever requires very nearly the same treatment as that suggested for typhus. The diarrhœa need not be checked unless the passages number more than three or four a day, or are uncommonly copious; then astringents combined with opium may be administered. The discharges should be promptly removed and appropriate disinfectants used. The patient requires to be carefully attended to during convalescence, as relapses are apt to occur; and the return to a generous diet must be gradual.

Cerebro-Spinal Fever. Cerebro-spinal fever is a malignant epidemic disease attended with lesions of the brain and spinal cord; chiefly of their surfaces and membranes. It prevails more extensively during cold weather than hot; attacks more males than females; and more persons under fourteen than over that age. The attack is generally sudden. Its symptoms are chilliness, terrible pain in the head, contraction of the muscles of the back of the neck, with intense pain, tenderness of the spine and limbs, nausea, vomiting, feverishness and violent delirium, ending sometimes in coma; when there is no coma there is painful sensitiveness of the surface of the body. Convul-

sions often occur in the young, and the terrible pains give rise to hideous cries.

Cerebro-spinal fever is very fatal; more than half the cases die. Some epidemics have been more rapidly fatal than others; and the disease has destroyed life in less than six hours from its commencement. Those who survive five days have a fair, though not certain, prospect of recovery. Convalescence is tedious, and relapses are apt to occur. In favorable cases a period varying from two weeks to six months may elapse between the day of attack and that of complete recovery; all complications greatly aggravate the danger.

The most unfavorable symptoms are a preternaturally slow pulse; rigid retraction of the head; convulsions; incontinence of urine; coldness of the skin with a diffused purplish hue; paralysis of the muscles of deglutition; dilatation and insensibility of the pupils, and deep coma. Recovery may occur after violent delirium, but when the patient has become profoundly comatose there is scarcely any hope.

In the treatment of the disease stimulants should be avoided until demanded by the flagging circulation. Probably more satisfactory results are obtained by the judicious use of calabar bean, ergot, bromide potassium and morphia, than any other remedies; these medicines to be used intelligently, as indicated by circumstances. Ice, or cold appli-

cations to the head, nape of the neck, and spine, is valuable in some cases; or in others it may be advisable to place a small blister behind the ears, a mustard draft to the nape of the neck and feet, and iodine along the region of the spine. The regimen should be the same as in other severe fevers. During convalescence the exhausted system may require a course of tonics.

Relapsing Fever. Relapsing fever prevails chiefly among the poorest classes in crowded localities; as its special cause appears to be over-crowding and starvation, it has been called "famine fever." It is not common in this country; the chief sufferers from it have been in Ireland during seasons of famine and destitution. It may occur in all seasons of the year and attack both sexes, of all ages, alike.

The attack is usually abrupt, and commences with rigors, frontal headache, muscular pains, and depression. As the disease advances, vomiting a bitter fluid, a white, moist tongue, hot, dry skin, epigastric tenderness, constipation, high-colored urine, a full, rapid pulse, and great restlessness are the symptoms presented. On the fifth, sixth, or seventh day, as matters begin to assume a threatening aspect, a profuse perspiration breaks out over the whole body, the fever disappears, and the patient is left greatly exhausted. He fancies perhaps that he is free from the disease, and that

a course of tonics will restore his strength. His improvement, however, is of short duration, for about the seventh day from the critical sweating — fourteenth day from the commencement of the disease — there is an abrupt relapse with a repetition of all the symptoms; but in three or four perspiration again sets in, and for a second time is followed by relief. Frequently a third relapse occurs. The debility is very great, and the return to perfect health very slow, but the disease is seldom fatal.

The treatment consists of a mild cathartic at the commencement of the disorder; refrigerating drinks, farinaceous diet, milk, and perfect rest, with opiates to relieve pain. The patient's uneasy sensations may be soothed by bathing the body with tepid water. When there is great prostration, the moderate use of wine may be allowed.

Intermittent Fever or Ague. Intermittent fever consists of cold, hot and sweating stages, in succession, attending each paroxysm, and followed by an intermission; no other disease has ordinarily so regular a succession of definite symptoms. There are several varieties of the disease; those commonly met with are called quotidian, tertian and quartan. When the paroxysm occurs at the same hour every day, it is called quotidian; when every other day, tertian; and

when it is absent for two whole days and then recurs, quartan. The interval is twenty-four hours in the first species, forty-eight in the second, and seventy-two in the third. The octan, or weekly return of the attack, is also occasionally met with. The time between the commencement of one paroxysm, and the beginning of the next, is termed the interval; that between the termination of one paroxysm, and the commencement of the next, the intermission.

The exciting cause of intermittent fever is marsh miasma, or the effluvia arising from stagnant water or marshy ground. These emanations are invisible, and are known as malaria.

Those most susceptible to the disease, are the young, unhealthy, over-fatigued, and such as are exhausted from want of food or sleep. Malarious districts are most dangerous at night. Those predisposed to intermittent fever, should not go outdoors between sunset and sunrise. As the poison lies near the ground, it is best for such persons to occupy rooms on the upper floor of the house.

The form of the disease which arises from exposure to malaria varies according to the constitutional predisposition of the individual; that which will produce ague in one person, perhaps giving rise to remittent fever or dysentery in another.

An attack of intermittent fever or ague begins with languor, frequent yawning and stretching, sluggishness in motion, a sense of debility and loss of appetite. The face becomes pale, and the features shrink. A sensation of cold soon comes on, with pains in the head, back, loins and joints. There is often a feeling as if streams of cold water were running down the back with shivering, chattering of teeth, and rigors, or tremulous movements. Nausea and vomiting usually occur; the respiration is hurried and oppressed; there is a peculiar mental irritability; often urgent thirst; and the pulse is small, frequent, and often irregular. The duration of this cold stage varies from ten minutes to two or three hours, and is gradually succeeded by the hot stage, which is one of reaction. The surface of the body becomes dry and intensely hot. The mouth is parched, tongue furred, there is excessive thirst, pulse full and bounding, sense of fulness in the head with violent headache, great restlessness, general uneasiness and sometimes delirium. This condition continues rarely less than two or more than twelve hours; then follows the sweating stage. This comes on gradually, commencing with the face, and extending over the whole body, and is attended with increased comfort. The pulse and breathing become more natural, and the headache, heat of skin, and thirst abate.

If the case be recent, the patient may fancy, as all the distressing symptoms are relieved, that health is about restored; but these pleasing thoughts vanish with the return of the next paroxysm. Occasionally one or two of the three stages of intermittent fever are absent; then there is only a chill, or a fever, or a sweat occurring daily, or every other day.

The first object in the treatment of intermittent fever is to remove from the malarious district; for the best remedies often prove ineffectual without a change of residence. During the paroxysms, palliative measures are indicated. A full opiate, or the moderate use of stimulants at the beginning of the cold stage, is often beneficial; warm, diluent drinks may be freely allowed; while the application of external warmth should be employed.

During the hot stage, ice and cooling drinks are required, and the surface of the body may be sponged with tepid water. Tepid drinks may be given during the sweating stage, to encourage the action of the skin.

What is wanted is something that will prevent the recurrence of the paroxysm; for the disease, if left to itself, may continue several weeks or months. Of the remedies used to arrest the disease, sulphate of quinine, in appropriate doses, has the most universal reliance; arsenic ranks next. There are various other remedies in use

which have their value, and may be administered when, for some reason or other, these are undesirable.

Remittent Fever. The causes of remittent fever are the same as those of the disease just described. Its symptoms also resemble those of intermittent fever, but are distinguished from it by the occurrence of remissions instead of intermissions; there is no cessation of the fever, but simply an abatement or diminution. The period of remission varies from six to twelve or fourteen hours, at the end of which time the feverish excitement increases.

The disease, if not shortened by proper treatment, will run on one, two, or three weeks, when it may terminate rather abruptly in profuse perspiration, or its symptoms may merge into those of low fever.

The principles of treatment of remittent fever are essentially the same as in intermittent fever, or in the continued fevers. To arrest the disease, anti-periodic remedies should be employed.

Yellow Fever. Yellow fever is an acute malignant epidemic disease, met with only in warm climates; frost destroys its specific poison. Its attack is sudden, often commencing in the middle of the night; but in some cases, for two or three days before the seizure, there is a feeling of weakness and restlessness, followed by loss of appetite, giddiness,

frontal headache, chilliness, and pains in the back or limbs. These symptoms are succeeded by a high degree of fever, hot, dry skin, excessive thirst, flushings in the face, eyes congested and painful, gaspings for cool air, violent headache, irritability of the stomach with tenderness on pressure, nausea, vomiting, furred tongue, anxiety, great restlessness, heavy respiration, sighing, sleeplessness, and perhaps active delirium.

These symptoms greatly diminish in severity at the end of the second or third day, and the flush of the face and other portions of the skin is succeeded by yellowness, which grows deeper as the disease advances. In some cases, however, convalescence now takes place; but more frequently the disease becomes aggravated in the course of twenty-four or forty-eight hours, and prostration and collapse follow.

As the fever progresses, the stomach becomes excessively irritable, and when the disease is about to end fatally, a black or dark-colored fluid is vomited. This "black vomit," as it is termed, consists of blood altered by the action of the fluids of the stomach. About one third of those afflicted with yellow fever die from its effects. Death most frequently occurs on the fourth, fifth, or sixth day.

No specific has been found for yellow fever, and no abortive treatment. Attention should be

given the hygienic management of the case, and such medicines used as will relieve the distressing symptoms as they occur.

V. — THE ERUPTIVE FEVERS.

The eruptive fevers are continued fevers attended with eruptions or efflorescence. The chief are small-pox, cow-pox, chicken-pox, measles, and scarlet fever. They all arise from a specific contagious poison, and each is a distinct species of fever, having phenomena and laws which are distinctive. A variable amount of time (called the period of incubation) elapses between the reception of the poison and the occurrence of the symptoms.

Those who have been exposed to small-pox, scarlet fever, measles, typhus fever, diphtheria, whooping cough, or any other infectious disease, should not take up their residence in a household where there are others liable to be infected, until the expiration of the period of incubation shows that they have escaped. Typhus fever, diphtheria, and whooping cough, are not eruptive fevers, but as they are infectious, we speak of them in this connection.

The period of incubation, without going to extremes, may, for practical purposes, be considered to be for small-pox, typhus, whooping cough,

and measles, fourteen days each; and scarlet fever and diphtheria ten days each. Convalescence from these fevers should be considered as still liable to give off infection until the expiration of time — counting from the beginning of the illness — ranging for each fever as stated below: Small-pox, fourteen days after the termination of scabbing; typhus, twenty-eight days from inception; scarlet fever, seven weeks from inception; diphtheria, six weeks from inception; whooping-cough, eight weeks from inception; measles, six weeks from inception.

How to Prevent the Spread of Infectious Diseases. The Board of Health of the State of New York has published a memorandum (circular No. 15) of sanitary precautions to prevent the spreading of infectious diseases, which we present as follows:

Cleanliness and Ventilation are in all cases and everywhere of the first importance. The diseases which are spread chiefly from place to place and from person to person by means of their own infection or contagion, are to be regarded and treated as enemies, to be resisted and stamped out. The propagation of some of them with the help of local causes, seen or unseen, and the fatality, as well as spread, of each one of them, is increased by personal uncleanliness and local unhealthfulness. Diphtheria, Measles, Scarlet fever, Typhoid fever, Puerperal fever and Small-pox, are the most pestilent of these infectious diseases in this State. But Typhoid fever and Malignant Cholera are infectious by means of excremental matters rather than from bodily emanations. Typhus spreads by its personal contagion, and it originates among crowded and uncleanly people. These diseases are all infectious and contagious and require disinfection and all sanitary precautions that prevent infection.

Small-Pox, Scarlet Fever, Diphtheria, or Measles. The patient should be kept in a separate room (preferably on an upper floor) from

which, if possible, carpets, curtains, stuffed furniture, clothing and other articles not required for immediate use, should be removed beforehand; and no person except the physician, nurse or parent, should be allowed to enter the sick-room, or to touch any of the articles used therein, until after thorough disinfection.

To Disinfect Clothing, &c., in the Sick-Room. Keep in the room a tub containing a quarter of a pound of sulphate of zinc and two ounces of common salt to each gallon of water. All bed linen, towels, clothing, handkerchiefs, etc., used about the patient, should be allowed to soak in this solution for at least an hour before removal from the room, and afterwards be thoroughly boiled, separate from the rest of the family washing. Never send such articles to a public laundry.

To Disinfect Discharges from the Patient. Use the same disinfecting fluid as in disinfecting clothing, but three times stronger, or use copperas water, made by dissolving a pound and a half of copperas in a gallon of water. The latter answers for all excremental discharges, while the former is best for all articles of clothing and furniture. All vessels used in the sick-room should be disinfected with one or other of these disinfecting fluids, unless immediately immersed in boiling water. Disinfect the discharges and clothing immediately.

Typhoid Fever. The poison lies in the discharges from the bowels, which should be at once disinfected with the solution of the zinc-salt, or of copperas. Particular care should be exercised to prevent any possible contamination of sources of drinking water with these discharges. Bed clothing or other articles soiled by the evacuations should be treated with the zinc solution, and be boiled.

Dysentery and Cholera. Same regulations as in Typhoid fever.

Typhus Fever. Enforce free ventilation, and disinfection of clothing, as above described. Attend to the fumigation of the sick-room and its bedding.

To Prevent the Body of the Patient from Spreading Contagion. In the eruptive diseases, especially in Scarlet fever, the patient's body should be anointed at least twi ce a day with oil, lard, or vaseline, containing about ten grains of carbolic acid or of thymol to the ounce. This process should be maintained until all bran-like scaling of the skin is at an end. The zinc-salt solution should be used as directed. Before again associating with unprotected persons, the patient should have several complete ablutions, including thorough washing of the hair with soap or borax; and none of the clothing worn for several days before the disease declared itself should be again used until thoroughly disinfected, and ventilated in the open air several days.

Avoid visiting houses where there are any of these diseases. Occupants of such houses should not visit.

Instructions for Disinfection. The best instructions for disinfection that we can give is to present those prepared under the direction of the National Board of Health and published by the State Board of Health of New York as circular number sixteen. They are as follows:

Disinfection is the destruction of the poisons of infectious and contagious diseases.

Deodorizers, or substances which destroy smells, are not necessarily disinfectants, and disinfectants do not necessarily have an odor.

Disinfection cannot compensate for want of cleanliness nor of ventilation.

I. Disinfectants to be Employed.

(1.) Roll sulphur (brimstone) for fumigation.

(2.) Sulphate of iron (copperas) dissolved in water in the proportion of one and a half pounds to the gallon: for soil, sewers, etc.

(3.) Sulphate of zinc and common salt, dissolved together in water in the proportions of four ounces sulphate and two ounces salt to the gallon: for clothing, bed-linen, etc.

II. How to use Disinfectants.

(1.) *In the Sick-room.* The most available agents are fresh air and cleanliness. The clothing, towels, bed-linen, etc., should, on removal from the patient, and before they are taken from the room, be placed in a pail or tub of the zinc solution, boiling-hot if possible.

All discharges should either be received in vessels containing copperas solution, or, when this is impracticable, should be immediately covered with copperas solution. All vessels used about the patient should be cleansed with the same solution.

Unnecessary furniture, especially that which is stuffed, carpets and hangings, should, when possible, be removed from the room at the outset; otherwise, they should remain for subsequent fumigation and treatment.

(2.) *Fumigation* with sulphur is the only practicable method for disinfecting the house. For this purpose, the rooms to be disinfected must be vacated. Heavy clothing, blankets, bedding, and other articles which cannot be treated with zinc solution, should be opened and exposed during fumigation, as directed below. Close the rooms as tightly as possible, place the sulphur in iron pans supported upon

bricks placed in wash-tubs containing a little water, set it on fire by hot coals or with the aid of a spoonful of alcohol, and allow the room to remain closed for twenty-four hours. For a room about ten feet square, at least two pounds of sulphur should be used; for larger rooms, proportionally increased quantities.

(3.) *Premises.* Cellars, yards, stables, gutters, privies, cesspools, water-closets, drains, sewers, etc., should be frequently and liberally treated with copperas solution. The copperas solution is easily prepared by hanging a basket containing about sixty pounds of copperas in a barrel of water.

(4.) *Body and Bed Clothing, etc.* It is *best* to *burn* all articles which have been in contact with persons sick with contagious or infectious diseases. Articles too valuable to be destroyed should be treated as follows:

(*a.*) Cotton, linen, flannels, blankets, etc., should be treated with the boiling-hot zinc solution; introduce piece by piece, secure thorough wetting, and boil for at least half an hour.

(*b.*) Heavy woolen clothing, silks, furs, stuffed bed-covers, beds, and other articles which cannot be treated with the zinc solution, should be hung in the room during fumigation, their surfaces thoroughly exposed, and pockets turned inside out. Afterward they should be hung in the open air, beaten and shaken. Pillows, beds, stuffed mattresses, upholstered furniture, etc., should be cut open, the contents spread out and thoroughly fumigated. Carpets are best fumigated on the floor, but should afterward be removed to the open air and thoroughly beaten.

(5.) *Corpses, especially of persons that have died of any infectious or malignant disease*, should be thoroughly washed with a zinc solution of double strength; should then be wrapped in a sheet wet with the zinc solution, and buried at once.

Metalic, metal-lined, or air-tight coffins should be used when possible; certainly when the body is to be transported for any considerable distance.

NOTE.—These instructions were prepared at the request of the National Board of Health by Professors C. F. CHANDLER, HENRY DRAPER, G. F. BARKER, S. O VANDER-POEL, E. G. JANEWAY and IRA REMSEN. They combine the best experience with accurate knowledge of the chemistry of DISINFECTION.

The chemicals here recommended are simple, safe and effectual; they are cheap and can be obtained in every town, and used in the ways here described, they will destroy contagious and infectious matter, and the directions for *Fumigation, Boiling, Ventilation, Cleansing* and *Drying* can be carried out in any house; but let it be remembered that *there are no substitutes for Cleanliness and Fresh Air.*

The State Board of Health advises that these instructions be followed.

ALBANY, *March*, 1882. ELISHA HARRIS, M. D., *Secretary.*

Small-pox. Small-pox is the most remarkable and most loathsome of the eruptive fevers. It is due to the reception into the blood of a specific poison which does not give indications of its power until twelve days afterwards.

Small-pox is supposed to have been introduced from Ethiopia into Arabia about A. D. 572. The wars which were carried on in the East, and particularly the crusades in the twelfth and thirteenth centuries, introduced it into Europe; first into Spain and France, and then into other countries.

The disease in its entire course goes through four stages: that of incubation, of primary fever, of eruption, and of secondary fever. After the period of incubation the attack begins with languor, shivering, pain in the back and loins, headache and loss of appetite, followed by heat and dryness of the skin, a hard and frequent pulse, pain in the epigastrium, with nausea, vomiting, and sometimes delirium or convulsions. On the third day an eruption of small red pimples appears, first on the face, then on the neck, arms, trunk, and lower limbs. The pimples gradually ripen into pustules, which on the eighth or ninth day generally begin to break, and crusts or scabs form on them. Four or five days later (about the fourteenth day of the fever) the scabs begin to fall off, and desquamation is usually completed by the end of the third week of the attack.

The severity of the disease bears a direct relation to the quantity of the eruption. When the pustules are numerous they run together and form an irregular outline; when fewer they are distinct or separate from each other. The former is called confluent small-pox, and is never free from danger; the latter discrete small-pox, and is seldom attended with danger. In confluent small-pox, not only is the whole surface of the body covered with inflamed pustules, but the mouth, throat, eyes and ears may be invaded, and blindness and deafness often follow. A peculiar disagreeable odor emanates from the body of those afflicted with the disease, which once smelt cannot be forgotten.

Varioloid, or abortive small-pox, is that form in which the eruption stops in its vesicular stage, most of the vesicles drying up instead of going on to the formation of pustules. This modification of the disease is due to vaccination. One attack of small-pox as a rule exhausts the susceptibility of the system to the future influence of the poison.

Small-pox is a disease that is self-limited. There is no specific remedy for it, no cutting it short. All that can be done is to palliate it, make the patient as comfortable as circumstances will allow, and conduct the disease to a favorable termination.

When the preliminary symptoms are presented the patient should take a warm mustard foot bath, then go to bed in a large, well-ventilated room, free from carpets, curtains, and superfluous furniture. Lemonade, barley-water, plain water, or ice may be allowed, and also ripe fruits, especially grapes and oranges in moderate quantities. If constipation accompanies the fever, a cooling laxative, as Rochelle salts or citrate magnesia, may be given; then perhaps refrigerant diaphoretics will be required. Sponging the body with tepid water, if the skin is very hot, will prove very refreshing, especially if its use be followed by a change of linen. As there is a tendency to exhaustion, concentrated liquid nourishment should be given, accompanied, if necessary, by a moderate quantity of alcoholic stimulants. To relieve the intolerable itching, the officinal lime liniment may be freely used; it will also prevent pitting to a certain extent. It may be prepared by mixing one half pint lime water with seven troy ounces of flaxseed oil.

It is often important to prevent pitting of the face. This may be accomplished by excluding the air and light, and lessening the irritation and keeping the tissues moist. A plan often adopted to prevent pitting is, to touch each pimple on the face, on the fourth or fifth day after the attack, with a point of lunar caustic; then apply

a flaxseed poultice to the whole face for four or five days, after which a mixture of collodion and glycerine should be applied thickly over each pustule, renewed occasionally until desquamation has been completed.

As there is no contagion so powerful or so certain as that of small-pox, suitable disinfectants should be freely used. (See How to Prevent the Spread of infectious Diseases, and Instructions for Disinfection.) And all persons should be vaccinated with pure bovine virus, and thus prevent the spread of the loathsome disease. A small quantity of matter taken from a pustule of a small-pox patient, and inserted beneath the skin of a healthy person, gives rise to a much milder form of the disease than would arise by inhaling the contagious poison; this is called inoculation, and was extensively practised before the discovery of vaccination.

Vaccine, or Cow-pox. A disease of the cow called vaccine, or cow-pox, communicated to man, generally destroys the susceptibility to small pox. In the few cases in which it does not afford complete protection, should small-pox occur, it will be in a very mild form, of short duration, unaccompanied by secondary fever, and devoid of danger; it is then called varioloid.

Cow-pox is transferred to man, and from one person to another, by inserting some of its virus

or lymph under the skin, or applying it to an abraded surface; this operation is called vaccination, and its value as a means of preventing the spread of small-pox was made known to the world in 1798, by Edward Jenner, an English physician.

If all persons were properly vaccinated with pure vaccine matter, small-pox, the most loathsome pestilence, would soon be unknown. After an individual has been vaccinated, if the operation has been successful, the part becomes inflamed about the third or fourth day. This inflamed spot increases in size, and in its centre a distinct vesicle is formed about the fifth or sixth day, with an elevated edge and depressed centre; it is of pearl color and distended with lymph on the eighth day, when the constitutional effects — headache, loss of appetite, slight chilliness, etc. — begin to appear, but they subside in a day or two. The fluid then dries up, and a dark-brown scab forms which remains for about two weeks, leaving a circular, depressed scar, permanent in after life.

Vaccination when not properly performed, or when bad matter is used, is often the means of engrafting upon the constitution some impure disease; therefore vaccine virus of a doubtful character should never be used. The only safe plan is to use, with a perfectly clean lancet, nothing but the pure matter obtained direct from a healthy young heifer.

Although many persons are protected by one good vaccination for life, every individual should be vaccinated at least three times during a life time — once in infancy, once after puberty, and once when about forty-five or fifty years of age. It is also a safe precaution to re-vaccinate at any time in case of known exposure, or when small-pox prevails as an epidemic. Re-vaccination is the readiest and safest test of insusceptibility to small-pox; and when properly performed with pure virus can do no harm.

Chicken-pox. Chicken-pox, or varicella, is a mild disease almost peculiar to infants and children under twelve years of age. It sometimes prevails as an epidemic; but it generally runs through all its phases in one week.

It is slightly infectious, and after an incubation of four or five days from exposure to the contagion, small rose pimples form, as a rule widely scattered. These pimples become transparent vesicles, filled with lymph, and surrounded by slight redness. About the fourth day the vesicles form small scabs which rapidly desicate: permanent pitting is a rare result. There is but little or no constitutional disturbance, and no danger to life. Precautionary treatment usually is all that is required. The patient should avoid exposure to cold and wet, keep the bowels regular, and the secreting organs in a state of healthy activity.

Measles. Measles, sometimes called rubeola from the red color of its eruption, is a continued infectious fever; the result of the absorption of, and contamination of the blood by, a morbid poison. After an incubation of from ten to fifteen days from exposure to its contagion, the disease commences with all the symptoms of a violent cold; sneezing, redness and watering of the eyes, running at the nose, dry cough, hoarseness, etc. Chilliness, loss of appetite, lassitude, and all the ordinary symptoms of fever quickly follow. A crimson rash appears on the fourth day of the attack; first on the face and neck, and gradually extends over the body and limbs; it begins to fade on the seventh day of the attack in the same order, and is succeeded by considerable itching.

Measles is frequently met with in children, occasionally in adults, and rarely in nursing infants. It is usually a mild and often a trivial disease; still it is sometimes accompanied by grave complications and serious sequels. It is important that it should be discriminated from other eruptive fevers as early as possible.

False measles, sometimes called roseola or rose rash, is an eruptive fever of little importance. It lasts but a few days, requiring little treatment.

German measles, so called, is a hybrid between measles and scarlet fever. In its severity it is similar to measles.

The treatment of measles must not be too active; palliative measures and attention to hygiene are, as a rule, all that is required. Mucilaginous drinks, gentle aperients and mild diaphoretics may be used. When the cough is troublesome, and there is much restlessness or vigilance, anodynes may be indicated. The eyes should be protected from the light, and if necessary the patient should be kept in a dark, but properly ventilated room. The application of a mustard draft to the chest, and also a hot mustard foot bath may sometimes be required. Debility may oftentimes require tonics during convalescence.

Scarlet Fever. Scarlet fever or scarlatina, so called from the color of its eruption, is remarkable for the wide diversity which it presents in different cases as regards symptoms and fatality.

It has been divided into three varieties; viz.: scarlatina simplex, in which there is a florid rash and little or no affection of the throat; scarlatina anginosa, in which both the skin and throat are decidedly implicated; and scarlatina maligna, in which all the force of the disease seems to be expended upon the throat.

Scarlet fever in its mildest form is a trivial affection; but in its severest form there are few diseases more appropriately styled malignant. It occurs most frequently in the third and fourth year of life; the liability to it is diminished after

the fifth year, and becomes very small after forty. As a rule, the susceptibility of the disease is destroyed by one attack.

An attack of the disease usually commences (after an incubation of about five days from exposure to its cause) with shivering, lassitude, headache, and pains in the back and limbs, followed by more or less fever, restlessness, loss of appetite, nausea and vomiting. The throat may be sore on the first day, and on the second the eruption begins to come out, though in some of the worst forms it may be deferred to the fourth day. It is of a scarlet, or sometimes a brick-red hue, uniformly diffused, with a swollen appearance and great heat. The tongue has a strawberry-like look from the projection of enlarged red papillæ through a whitish fur.

In the favorable cases the eruption remains three or four days and then begins to fade, becoming by degrees indistinct, and disappearing altogether in the majority of instances before the end of the seventh day. In scarlatina anginosa the throat becomes foul and sloughy, and the disease is often threatening and serious. In scarlatina maligna the eruption, if it appears at all, is livid or partial, fades early and is attended with a feeble pulse, a cold skin, and extreme prostration of strength. Recovery from this variety of scarlet fever is the exception, however, and sometimes the patient sinks

under the virulence of the poison in a few hours.

Scarlet fever has a tendency to give rise to other diseases; those who have suffered from it may afterwards be afflicted with boils, strumous ulcers, various forms of scrofula, dropsy, etc.

The treatment of scarlet fever in the majority of cases should be chiefly hygienic. Pure air, cooling drinks, an unstimulating diet, proper clothing, maintaining the functions of the skin, and attention to the bowels are the essentials. Medical advice, however, should always be obtained, for troublesome sequels may occur even in mild cases. Exposure to cold is to be avoided, both while the disease is in progress, and during convalescence, but care in this respect should not lead to error in the way of free ventilation. Warm baths may be given early in the progress of the disease, as it brings out the rash, reduces the temperature, and soothes the patient. The patient may be kept in the bath from three to five minutes, then rapidly dried, wrapped in flannel and returned to bed.

The sore throat, which is specific in character, may require the use of local alteratives, and of chlorate of potassa internally. An old and popular gargle is the red pepper tea spoken of on page 172. Iced drinks are useful in giving temporary relief. Tincture of iodine may be applied externally to glandular swellings in the neck. The

only chance of success in the treatment of malignant scarlet fever lies in stimulation. The vital powers are so prostrated by the deadly force of the poison, that unless they are supported by the judicious use of wine, brandy, or whiskey, they will fail altogether.

Erysipelas. Erysipelas is a miasmatic disease due to the absorption of a specific poison; it is characterized by a low form of fever, with a diffuse inflammation of the skin, or subcutaneous areolar tissue, or of both together.

It can be generated by inattention to sanitary laws; it is infectious, and spreads by fomites; and sometimes prevails epidemically. It may attack any portion of the surface of the body, and is called erysipelas from its tendency to spread to adjoining parts. When it prevails epidemically, intemperance, insufficient food, foul air and wounds or injuries favor its occurrence. When the disease arises from internal causes — idiopathic erysipelas — it most frequently attacks the integuments of the head and face. When it follows wounds — traumatic erysipelas — it commences at or around the seat of injury.

Idiopathic erysipelas begins with a cold stage, followed by fever and general constitutional disturbance. On the second or third morning, a red spot, accompanied by burning heat and slight swelling, appears in some part of the body and

spreads like a slow conflagration from part to part. When it appears on the face, the cheeks enlarge, the lips swell, the eyes become closed by their puffy lids, and the features are distorted. Delirium is common when the scalp is the seat of the eruption.

The disease has no definite period of duration, but in mild cases the redness fades, the swelling subsides, and the cuticle desquamates in the course of a few days. The inflammation is merely superficial in most cases, and the disease is spoken of as simple or cutaneous erysipelas; but occasionally the subcutaneous connective tissue is involved, and suppuration, sloughing, or gangrene, may result; the disease is then spoken of as plegmonous or cellulo-cutaneous erysipelas. Erysipelas that follows wounds combines the danger of the disease itself with that of the injury or local affection from which it starts.

Death may result from erysipelas by a failure of the vital powers, or by the inflammation and swelling extending to the neck and throat, giving rise to suffocation; or by the extension of the inflammation to the brain and its membranes giving rise to effusion and coma.

The diet of those afflicted with erysipelas should be light, but nourishing; they should have plenty of pure air, but advoid drafts; and ice and cooling drinks may be allowed. A mild laxative may

be given at the commencement of the disease, and if the system is enfeebled, iron, quinine, or other tonics, or perhaps even stimulants, may be required.

To prevent erysipelas from spreading, boundary lines may be drawn on the sound skin with tincture of iodine or nitrate of silver; or what is perhaps better in most cases, is to paint around the affected part a solid ring of collodion. A strong solution of tannin or a saturated solution of boracic acid may be freely applied to the inflamed skin in some cases. The former is not disagreeable to the patient, and the latter is soothing and devoid of smell or staining qualities. Cranberry poultices often "act like a charm," when used for deep-seated cellular erysipelas, but are not of much value in other erysipelas. It perhaps is unnecessary to add that the treatment of erysipelas, like that of most other diseases, varies with the nature of the disease and the condition of the patient.

VI.—DISEASES OF THE NERVOUS SYSTEM.

As the nervous system presides over and governs the entire body, the diseases to which it is liable, exerts a more extensive influence than any other bodily affliction. The mind and body reciprocally act upon each other; therefore, to avoid nervous diseases, it is not only essential that attention be given to the state of the body, but it is of the utmost importance that a calm and uniform state of mind, one not easily disturbed by the crosses and accidents of life, be maintained.

The greater part of the diseases affecting the nervous system relate to the nervous centres — the brain and spinal cord; still, some important affections are seated in the nervous trunks or their branches.

The simplest division of nervous diseases is into two kinds; viz: structural and functional. The former arising from some morbid change or lesion in the nerve structure; the latter including those in which there is no structural change to account for the symptoms.

Structural diseases may again be divided into two kinds; viz: those affecting the nerve centres,

and those affecting the nerves. The nerve centres are subject to diseases affecting their covering or membranes, their substance and their bloodvessels; some of the most important diseases of the brain and spinal cord have their point of departure in the membranes. Although the nervous system has diseases peculiar to itself, the brain and its membranes are subject to morbid conditions essentially the same as in diseases of the other parts of the body; viz.: congestion, inflammation, hemorrhage, and various structural lesions.

Functional diseases of the nervous system manifest themselves by irregular, depressed or exalted conditions of the processes and functions of the system; viz.: the mental faculties, special and general sensibility, voluntary motion, involuntary or reflex movements, and innervation.

Inflammation of the Brain. When the parts within the cranium — either the substance of the brain, or its membranes, or both — are inflamed, the condition is commonly spoken of as inflammation of the brain.

Inflammation of the membranes of the brain — meningitis — and of the substance of the brain — cerebritis — although distinct affections, are usually associated; inflammation of the membranes having a tendency to spread to the substance of the brain, or the reverse obtaining; the co-existence of the two affections being called meningo-cerebritis, or

encephalitis. It most frequently occurs in males between fifteen and forty-five years of age. Hot climates, and intemperate living, predispose to it. Exciting causes are external injuries, as blows or falls upon the head, and exposure to the sun, violent or prolonged mental excitement, erysipelas of the head, etc. Its symptoms are fever, intense headache, nausea and vomiting, redness of the face and eyes, an excited look, dizziness, roaring in the ears, sharp, hard, and irregular pulse, extreme sensitiveness to light and sound, restlessness, wakefulness, confusion of thought or even wild delirium; the bowels are usually constipated. These symptoms are most marked when the meningitis predominates.

The second stage, the period of collapse, sets in at the end of twelve, twenty-four or forty-eight hours. The patient's vision and hearing become dull, his articulation difficult or indistinct, and he falls into a state of stupor. The countenance gets ghastly, sordes form on the gums and teeth, the body becomes covered with cold sweats, and finally a few convulsive paroxysms may occur, followed by paralysis, profound coma and death.

Fortunately, the disease is not of frequent occurrence, and although the majority of cases end in death, many recover under good treatment.

In treating inflammation of the brain, the hair should be cut very short, cold water or ice applied to the head, and the hands and feet placed in hot baths; bleeding is sometimes advisable; a mustard plaster may be applied to the back of the neck, and active cathartics and saline diuretics administered. The patient should be kept in a cool, dark, well-ventilated room, free from the slightest noise, and the diet should be light and unstimulating.

Apoplexy. The common expression, "an apoplectic stroke," is applied to a state of coma occurring suddenly, from pressure upon the brain; the compressing power having its seat within the cranium, and usually consisting of blood that has escaped from a ruptured artery.

Apoplexy is so called because those attacked fall down suddenly as if from a blow; it occurs chiefly at an advanced period of life, and is sometimes due to intense and suddenly developed congestion of the brain. The disorder is sometimes preceded by a flushed appearance of the face and eyes, dimness of sight, giddiness, headache, loss of memory, faltering of the tongue in speaking, numbness in the extremities and drowsiness. Sudden stupor soon follows. In most cases, however, there are no well-defined premonitory symptoms — the patient being suddenly deprived of the exercise of all the senses, and of voluntary motion; the countenance becomes florid;

the face appears swollen and puffed up; the blood-vessels of the neck and temples are turgid and distended with blood; the pulse is strong and full; the eyes are prominent and fixed; and the breathing is stertorous.

The duration of the apoplectic fit varies from two or three hours to as many days; throughout which time there is total unconsciousness. The danger of the attack is somewhat in proportion to the depth of the coma, the amount of stertorous breathing and puffing out of the cheeks, the degree of prostration, and the difficulty of swallowing. Each succeeding attack becomes more dangerous, and a third is seldom survived.

Those emerging from the apoplectic state appear as if awakened from profound sleep; but generally they are found to have more or less paralysis, and more or less impairment of the mind. The paralysis, in the majority of cases, affects one side only, and is usually complete, the sensibility and the power of motion on the affected side being lost; but in most cases it gradually returns until a certain point is reached, and at this point, which varies in different cases, the improvement stops, and the remaining paralysis is permanent. The impairment of the mind is shown in failure to express wants in proper language, in failure of memory, in childishness, in irritability and impatience, and in the patient being more easily

influenced by others; weeping and mirthfulness are also excited by trivial causes.

When a predisposition to apoplexy is suspected, the individual should avoid alcoholic drinks, violent mental emotion, excessive exercise, exposure to extremes of temperature, overloading the stomach, and in fact everything tending to induce an undue accumulation of blood in the vessels of the brain.

During an attack of apoplexy the patient should have perfect rest in a cool, airy apartment, with the head raised and cold water or ice applied to it. Mustard plasters should be applied to the feet and calves of the legs; and in some cases, a powerful purgative may be administered — a drop or two of croton oil placed on the tongue perhaps, being the best. Bleeding, in a certain few cases, is beneficial, but will do harm if resorted to indiscriminately. The treatment after the attack will be considered under the head of paralysis.

Paralysis. The term paralysis, or palsy, denotes loss or impairment of sensibility or motion, or of both, in one or more parts of the body. It is owing to some diseased condition, either of the brain or spinal cord or of the nerves. The most severe and dangerous form of the disorder is that which follows an apoplectic attack.

Complete loss of sensation and motion of the whole system is general paralysis, but as this

cannot take place without death immediately resulting, the term "general paralysis" is applied to palsy affecting the four extremities, whether any of the other parts of the body are implicated or not.

When paralysis is limited to one side of the body, it is called hemiplegia; when it is confined to the lower extremities, it is called paraplegia; and when it affects only a small portion of the body, the paralysis is called local.

The treatment of the several forms or paralysis should be governed by the morbid conditions on which the paralysis is dependent, by co-existing affections in any part of the body, and by the state of the system. In a certain proportion of cases the paralysis depends on lesions which are irremediable, and but little can be done, either in the way of cure or alleviation. Among the most important means that may be adopted to rouse or restore the function of the paralyzed parts, to promote circulation in the parts, and to secure healthy nutrition, are friction, stimulating liniments, electricity, passive movements, strychnia, and exercise. The treatment should be directed intelligently and cautiously, or more harm than good will result. Electricity, although valuable in certain cases, should not be employed when there is structural disorganization, or it will do harm. Strychnia, when cautiously used in small doses,

is beneficial in cases of functional paralysis; when used to relieve the paralysis following apoplexy, it should be only after the acute stage has passed and the clot absorbed, or the clot may be excited into an irritating foreign body.

Sunstroke. Sunstroke, or heatstroke, is a disease caused by exposure to the direct rays of the sun, or excessive heat.

The direct rays of the sun upon the head, particularly while laboring or exercising actively on a hot day, may induce cerebral congestion, loss of consciousness and death in a few hours. In some instances the disease resembles apoplexy. Excessive heat not under the immediate influence of the sun may prostrate the vital powers, causing the forces which carry on the circulation to give way, and death to take place by syncope. This condition may be expressed by the term exhaustion.

"The premonitions of the attack are slight or wanting. Doctor Swift in a report based on the observation of the cases in the New York Hospital, gives the following account of the attack: 'The patients are suddenly seized, while in the performance of their labors, with pain in the head, and a sense of fulness and oppression in the epigastrium, occasionally nausea and vomiting, general feeling of weakness, especially of the lower extremities, vertigo, dimness of vision and insensibility. Surrounding objects appear of uni-

form color. In a great majority of cases, so far as could be ascertained, blue or purple. In one instance everything appeared red; in another green, and in another white.' It is stated by Longmore that irritability of the bladder precedes the attack. The attack may consist of only transient insensibility. But in severe cases the patient usually passes quickly into a comatose state."—*Flint's Practice Medicine, 3d ed., p.* 592.

To prevent sunstroke and other serious effects of excessive heat, the body should be bathed in cold water every morning; all intoxicating drinks should be avoided; but water, lemonade, and other simple diluents may be partaken of freely. The head should be kept wet with cold water, and when exposed to the sun covered with a light hat or thin folds of white linen kept wet. The natural perspiration should not be checked, the clothing should be light and loose, and the meals should be at regular hours. Should a sense of pain or tightness about the forehead, dizziness or weakness be experienced, the sufferer should retire into the shade and bathe his head with cold water.

The treatment of sunstroke or heatstroke consists in keeping the patient in as cool and pure an atmosphere as possible; to removing everything constricting the chest or neck, and applying ice or cold water to the head which should

be slightly elevated. Careful discrimination should be made between those cases called heat apoplexy and those called heat exhaustion; for certain methods of treatment that would be of the greatest benefit to one, would be of the greatest injury to the other. When there is cerebral congestion or heat apoplexy, the bowels should be freely opened with a dose of croton oil, or an enema; bleeding may also be required in some cases, and revulsive applications should be made to the extremities. Cathartics, bloodletting, and all depressing agencies do harm in heat or nervous exhaustion, and should be avoided in such cases, and aromatic spirits of ammonia, or a small quantity of alcoholic stimulants administered: these are especially indicated when there is danger of death by rapid asthenia or syncope.

Complete rest is of the first importance in both class of cases. Those cases in which there are convulsions, twitchings, delirium or general excitement, are greatly benefitted by the hypodermic injection of morphia.

After consciousness has returned the patient should avoid all excitement, and may be given bromide potassium, which has been found the most proficient of the numerous drugs employed.

Headache. Headache, or pain in the head, is of very common occurrence; it is present as a symptom during some part of the progress of most acute,

and many chronic diseases. There are but few persons who do not occasionally experience an attack, and there are very many who are subject to attacks recurring sometimes at regular, but usually at irregular intervals.

Headache may be divided into four principal varieties; viz.: *organic headache*, due to disease of the brain or its membranes; *plethoric headache*, dependent upon fulness of blood; *bilious headache*, caused by errors of diet, a weak stomach, indigestion, lack of exercise, and ill-performed functions of the liver; and *nervous headache*, due to debility and exhaustion.

"Headaches of whatever kind occur more frequently in persons of adult life than in extreme youth or advanced age; and in the brain workers rather than among mechanics. Their occurrence is favored by hereditary predisposition. Habitual dwellers in towns suffer more than residents in the country; females more than males, the nervous and delicate more than the robust, and the middle and higher classes of society more than the lower. And then lastly, Dr. Wright says that all pains in the head 'especially affect persons who neglect the many little attentions and cares that our civilized, and therefore in some measure, artificial mode of life requires. I may especially instance regularity in diet, carefulness in adapting the clothing to the requirements of our variable climate,

attention to the action of the bowels, and a sufficient amount of exercise, as essential objects of our care.'"— *Tanner's Practice Medicine, 5th American ed., p.* 397.

The treatment of headache consists in keeping the head cool, the feet warm, the bowels regular, and the use of such remedies, both internal and external, as the particular variety of headache may require.

When the headache occurs as a symptom in the course of some disease, the disease itself should be treated, and nothing more than palliative measures should be resorted to for the relief of the headache.

The treatment of periodical headache embraces measures to be employed at the time of the attack and during the intervals. Evaporating lotions applied to the head at the time of the attack, and the inhalation of a little of the vapor of chloroform often give immediate relief. Among the most valuable remedies used for various forms of headache are valerian, valerianate zinc, valerianate ammonia, aromatic spirits ammonia, guarana, bromide potassium and bromide camphor. Hygienic measures are important in the treatment of headache as well as many other diseases: the more the laws of health are observed the less the liability to attacks of the disorder.

Insanity. Of all our afflictions insanity is the

greatest; but what is insanity? Many attempts have been made to define it, but most of the definitions given are imperfect. It would be difficult to find one which includes all who are insane and excludes all who are sane. This difficulty is accounted for by the fact that in the early stages of insanity the mind often fluctuates between sanity and insanity; the shades of disordered intellect being so blended as to be scarcely distinguishable from a state of sanity; and even in cases of insanity of long standing the mental disorder varies greatly in its degree and character.

It is difficult to fix upon a standard by which a fair comparison can be made between sanity and insanity, because the mind differs in its power and manifestations in most persons. It is common to measure the cultivation and rationality of men by their knowledge; but this differs in different men according to the objects which most engage their minds; and by these objects its worth must be judged. Knowledge, however, does not constitute sanity, nor ignorance insanity. A lunatic may be either ignorant or educated, and has been defined to be an individual who reasons correctly from false premises; yet we know that not only many sane persons do this, but one who is insane often reasons falsely from the objects presented to his senses, or from his own fancies.

"The terms insanity, lunacy, unsoundness of

mind, mental derangement, mental disorder, madness, and mental alienation or aberration, have been indifferently applied to those states of disordered mind in which a person loses the power of regulating his actions and conduct according to the ordinary rules of society. In all cases of real insanity, the intellect is more or less affected — hence the term *intellectual insanity.* In a medical sense this implies a deviation of the mental faculties from an assumed normal or healthy standard. In an insane person there may be no bodily disease, but his language and habits are changed — the reasoning power which he may have enjoyed in common with others is lost or perverted, and he is no longer fitted to discharge those duties which his social position demands. Further, from perversion of reason, he may show a disposition to commit acts which may endanger his own life or the lives of those around him. It is at this point that the law interferes for his own protection and for that of society." — *Taylor's Medical Jurisprudence, 2d English ed., Vol. II. p.* 476.

. . . "Insanity consists of a functional or organic disease of the gray matter of the cerebral hemispheres; this disease giving rise to illogical or erroneous ideas, to disordered actions, and to that general mental condition which hinders a man from discharging his duties to his God, his neighbor, and himself. This definition is open to many

objections; and let doctors and lawyers vex themselves as they may, every endeavor to form one will be so. For as nothing can be more slightly defined than the line of demarkation between sanity and insanity, so if we make the definition too narrow it becomes meaningless, and if too wide the whole human race may be involved in it." — *Tanner's Practice Medicine, 5th American ed., p.* 372.

Insanity is usually divided into four varieties; viz.: mania, monomania, dementia and idiocy. In some instances a particular case cannot be assigned to either of these divisions, which is owing to the fact that the first three of these states of disordered mind are frequently intermixed, and are apt to pass and repass into each other; a case may also represent mixed characters which appertain to the four divisions.

Mania, or raving madness, is that form of insanity in which there is general derangement or perversion of the mental faculties, accompanied by greater or less excitement, sometimes amounting to violent fury. The reasoning faculty is disturbed, confused, or completely lost. The ideas are abundant, erroneous, absurd, and flow through the mind without order or connection; as they are not under control, the poor victim believes and acts upon them, however absurd and inconsistent they may be. There is rapidity of utterance, incessant agitation, great irritability, and not the least contradiction can be borne.

Mania usually comes on gradually, but sometimes it makes its incursion suddenly, as after a violent moral shock. When the disease is slowly developed, various premonitory symptoms, such as neglect of family and business, change of moral character, distrust of friends, fits of passion, despondency, sleeplessness, etc., occur. Mania may be acute or chronic, recurrent or continued. The excessive physical exertion which maniacs go through with in their fierce, rapid, and destructive acts, and, when talking, shouting, howling, laughing, reciting, etc., for hours at a time, together with their persistent sleeplessness, and perhaps aversion to food, soon makes them weak and emaciated. There are but few cases, however, in which there are not remissions more or less complete; and in some instances after a violent attack, the reason appears to be perfectly restored, forming then what is termed a lucid interval. More than half of the first attacks of mania are recovered from under good management. The hope becomes less with each repetition, and also in proportion to the duration of chronic mania. Recovery occasionally takes place, however, in those who have been insane for years.

Monomania, or partial insanity, is that form in which the disorder is confined chiefly to one subject, or one class of subjects. Monomaniacs have false ideas on certain points of which they can-

not divest themselves, and out of which they cannot be reasoned. They start from false principles, but their inferences and deductions from these principles often possess logical accuracy. The mind of a maniac is disordered on all subjects, but the mind of a monomaniac is like a sane person's in those particulars not connected with his special delusion.

Dementia, or incoherence, is that condition in which a general weakness of the intellect, induced by disease or age, is a prominent feature. It usually comes on gradually — the faculties decaying one by one; but in some instances it may occur suddenly from a violent shock or impression on the mind.

In confirmed dementia there is total absence of all reasoning power; an incapacity to perceive the true relation of things; a loss of memory and inconsistent actions and incoherent language. The patients speak without being conscious of what they are saying; their manners are undecided, childish and silly; and they are ignorant of time, place, quantity, property, etc. They have neither partialities nor aversions; neither hatred nor affection. They see their best friends without pleasure, and they leave them without regret.

Dementia varies in degree, and may be acute or chronic, remittent or intermittent. One form of the disease is the disordered mind of aged

persons who may possess momentary mental power and a certain amount of memory, although the latter is restricted to objects long since past. Some persons in dementia are quiet, others are in constant motion, as if in search of something. Dementia is very rarely, if ever, cured, and in its last stages there is complete paralysis. The ultimate tendency of mania and monomania is to pass into dementia.

Idiocy is characterized by partial or complete absence of the intellect, owing to imperfect organization of the brain. It differs from the other states of insanity in the fact that the sufferer has never had mental power, the defect in the structure of the brain having been inherited.

Idiots have a vague, unmeaning look, without the least approach to intelligence. They have but little or no power of speech, their minds seem to be a blank, and their actions depend upon impulse, or mere animal instinct. There is a state, scarcely separable from idiocy, called imbecility, in which the mind is capable of receiving some ideas, and of profiting to a certain extent by instruction. The mind of an imbecile, however, is not capable of being brought to a healthy standard of intellect like that of an ordinary person of similar age and social position.

"Idiocy and imbecility must not be confounded with mania and monomania. In idiots and imbe-

ciles, ideas are wanting, and the power of thought is absent or deficient; in maniacs and monomaniacs the ideas flow freely, but they are perverted, and the power of thought is irregular and uncontrolled. In idiocy and imbecility we do not meet with the hallucinations and illusions which constitute the main features of mania and monomania. Idiocy is much more likely to be confounded with dementia, and indeed when dementia is confirmed and complete (fatuity) there is no appreciable difference, for in neither state is there any evidence of the exercise of mental power.

"In idiocy no ideas have ever been formed; in imbecility they have been partially formed, but arrested; in dementia they have been more or less completely formed, but have subsequently become entirely obliterated. It is important to remember that in idiocy and imbecility there is no gradual loss or impairment of faculties, as is generally observed in dementia; the person is what he always has been — mentally weak and unsusceptible of any great degree of improvement by instruction." — *Taylor's Medical Jurisprudence, 2d Eng. ed., Vol.* II. p. 504.

The treatment of the insane has much improved during the past few years; they are no longer loaded with chains and confined in dungeons, but are treated with kindness and consideration, and allowed all the liberty that the nature of their mal-

ady admits of. The means adopted to effect a cure naturally resolve themselves into medical and moral; but it is not a good plan, as a general rule, for the friends of an insane person to assume charge of his case and endeavor to cure his affliction at home. Insanity should be treated only by those who make it a special study and are experienced in the business. The greatest hope of cure lies in the early removal to a well-conducted asylum or hospital for the insane where everything is arranged especially with a view to the most favorable effect upon its inmates.

Convulsions. Convulsions, or "fits," consist of violent, involuntary contractions of the muscles of the body, occurring in paroxysms, and usually associated with insensibility. There are but few symptoms accompanying disturbances of the nervous system, which cause greater alarm to the friends of the patient, than an attack of convulsions. Probably this is due to the suddenness with which the paroxysm occurs, the distortion of countenance which it produces, and the loss of consciousness that attends it.

Convulsions occur most frequently during the first eight years of life. They are produced by a variety of circumstances, prominent among which we may mention teething, indigestion, worms, constipation, sudden fright and disease of the brain. Those causes which produce delirium

in an adult, also produce convulsions in an infant.

Infants often suffer from what are commonly called "inward fits." When they occur the baby lies as if asleep, but rolls its eyes, moves the eyelids, breathes with a little difficulty, moans gently, the muscles of the face twitch slightly, there is the so-called "sardonic smile," and sometimes there is a livid ring around the mouth. This condition arises from flatulence and indigestion, and is a warning that the quality of the food should be attended to. It is usually relieved by gentle friction over the abdomen, together with the administration of two or three drops of the tincture of cardamons, or aromatic spirits of ammonia.

The treatment of convulsions will vary according to the circumstances of each case. We should ascertain the cause of the attack, and treat that. Loose clothing, fresh air, cold applications to the head, and hot applications to the feet, or a warm bath, are beneficial during the fit. Ice, nor wet cloths, should not be kept on the child too long, or they will do harm. When the stomach contains undigested food, emetics will be needed; when there is much flatulence, carminatives; and when the bowels are confined, gentle antacid purgatives. If the irritation is due to dentition, and the tense swollen gums appear to offer an obstacle to the passage of the teeth, they should be lanced. If there are in-

testinal worms, they should be got rid of by the use of suitable drugs. (See Intestinal Worms.)

Epilepsy. Epilepsy is a disease characterized by periodical convulsions, with unconsciousness during the attack. The patient may apparently be in ordinary health, engaged in his usual occupations, when suddenly, without warning, he may utter a piercing scream, or a suppressed groan, and fall to the ground senseless, violently convulsed.

The disease is commonly called "the falling sickness," or "fits." The ancients called it "the sacred disease;" they supposed, from the suddenness of its attack, that it was due to the influence of the gods or evil spirits.

Although epilepsy usually comes on suddenly, there are sometimes warnings of its approach; these may be irritability, headache, dizziness, noises in the ears, and floating specks before the eyes; there is also a peculiar sensation, called the epileptic aura, which is felt by some immediately before the attack; this is variously described as a creeping or blowing sensation, like that of a current of air, or stream of water, or slight convulsive tremor, beginning in the hand or foot, and extending upward to the head, when the patient is deprived of all consciousness. During the attack the face is flushed, the eyeballs roll, and there is gnashing of the teeth and frothing at the mouth.

The duration of the paroxysm is usually from five to ten minutes, but occasionally several attacks follow each other in rapid succession, and the patient is unconscious for hours. As the convulsive movements gradually diminish, the patient may recover a faint glimmering of consciousness; but the look which he casts around is stupid and heavy, and he immediately falls into a deep sleep, which may be protracted for hours, and from which he awakes exhausted, and with slight mental confusion or headache, but without any knowledge of what he has gone through.

The periods at which the seizures recur, are variable. Repeated attacks of the disease soon produce a marked change in the mental and physical character of the individual; it has a tendency to impair the memory, to weaken the understanding, and to produce a sense of mental depression and melancholy.

The tendency to epilepsy is often hereditary. Among the most frequent exciting causes are sudden fright, blows upon the head, intestinal worms, intemperance, etc. The disease is rarely fatal when uncomplicated. The patient is liable, however, to injure or kill himself by falling in some dangerous position; his tongue also, may be severely bitten during the paroxysm; this may be avoided by placing a piece of rubber or cork or soft wood between the teeth.

During an attack very little is to be done beyond loosening the patient's clothing, placing him in a comfortable position and giving him plenty of fresh air. In the interval between the attacks the patient should carefully observe the laws of health in respect to diet, air, sunlight, bathing, sleep, exercise, and should practise moderation in the indulgence of his passions. Chief among the remedies are bromide and iodide of potassium, and bromide of ammonium; these may be prescribed in such doses as the particular case may require; it is a good plan to combine them in a solution with tincture of rhubarb and compound syrup of sarsaparilla. When the appropriate remedies are judiciously employed, and a proper regimen strictly adhered to, epilepsy is often permanently cured.

Hysteria. Hysteria is a nervous affection to which unmarried females of weakly constitutions between the ages of fifteen and forty-five are particularly liable.

The attack is usually preceded by headache, dejection of spirits, anxiety of mind, difficulty of breathing, restlessness, cramps, coldness of the feet, yawning, and sometimes by immoderate fits of laughing or crying alternately. The patient often experiences a peculiar sensation as if a ball were advancing upward from the stomach into the throat, threatening to stop the passage of air: then the trunk and limbs of the body become violently

convulsed, the breathing becomes hurried, the heart palpitates and the patient sobs and cries and occasionally bursts into fits of laughter. The patient may assume a variety of positions, tear her hair, beat her breast, perhaps vomit a little, and be troubled with a distressing hiccough. The face is pale and flushed, alternate in delicate females; in the more robust it is flushed and appears fuller than usual.

The duration of an attack varies from a few moments to several hours; when the symptoms susbide, a quantity of wind is evacuated upwards, with frequent sighing and sobbing, and the patient gradually recovers; feeling, however, severe pain in the head, soreness all over the body, and an inclination to lie in a languid and listless state for some time.

Hysteria assumes such a variety of symptoms that an adequate idea of it cannot be conveyed in a concise description; but a minute account of all its various forms and relations is unnecessary, for however alarming and dreadful it may appear, it is rarely attended with any danger to life. It is very important, however, that it should be distinguished from other diseases.

The first care during a paroxysm is to prevent the patient from injuring herself by the violence of her struggles. If the fit be slight it may frequently be arrested by the sudden and free application of

cold water to the head and face; or by putting salt or something of an unpleasant taste in the mouth; or by applying some stimulating scent to the nostrils. The patient's clothing should be loosened and she should have plenty of fresh air. When the paroxysm is severe, there are various drugs, such as valerian, tincture valerianate ammonia, compound spirit of ether, and assafœtida, which may be administered with benefit.

After recovery from the attack the patient's general health should be improved; she should seek agreeable company, keep her mind as cheerful and tranquil as possible, and all tendency to excess or irregularities kept in check. Hot rooms and late evening parties should be avoided. When there is plethora or fulness of blood, a spare diet, exercise, and occasional laxatives are recommended; but when there is a deficiency of blood, a nourishing diet, tonics, bathing, out-door exercise and recreation are beneficial.

Chorea or St. Vitus's Dance. Chorea or St. Vitus's Dance is characterized by irregular, tremulous, and often ludicrous actions of the voluntary muscles over which the will has but partial control. It occurs most frequently in young girls between the age of six and sixteen; it commences with slight muscular twitchings which gradually increase in severity until the patient cannot walk without a jerking movement and staggering.

There is constant restlessness and the child finds it almost impossible to keep quiet; the muscles of the face twitch grotesquely and the speech may be affected. The irregular muscular actions almost invariably cease during sleep.

Chorea may last from one week to several months, and in some cases it has been known to continue through life. Although most common in girls, yet boys sometimes suffer from it. It is not dangerous to life, and when it occurs in young persons it generally terminates favorably in a few weeks under proper treatment; relapses, however, are liable to occur.

The most frequent cause of chorea is fright; but nervous debility is nearly always present before the attack. Excessive mental excitement when fatigued, and any irritation of the nervous system, may produce it.

The treatment of Chorea consists in the administration of tonics, aperients, and anti-spasmodics, with good diet, sea-water bathing, and out-door exercise. Iron and arsenic are valuable remedies in many cases.

Tetanus. Tetanus is a disease characterized by a violent, rigid and painful contraction or spasm of many or all of the voluntary muscles.

Persons of all ages and of both sexes are liable to its attack, which frequently arises from some irritation of the nerves in consequence of local

injury by puncture, incision or laceration; the disease may also be produced by exposure to cold and dampness.

Tetanus may come on suddenly with great violence, but more frequently its attack is gradual, beginning with slight stiffness in the back part of the neck, which increases and ultimately renders the motion of the head difficult and painful. An uneasy sensation is felt at the root of the tongue, which increases until the muscles about the jaws get involved, and the teeth become so closely set together as not to admit of the slightest opening. This is the most common form of the disease, and is called locked-jaw or trismus. When the disease extends further, the remaining muscles of the face, those of the trunk, and lastly those of the extremities, become affected so as to forcibly bend the body either backward or forward in the shape of an arch. Strychnia in poisonous doses produce symptoms which resemble those of tetanus.

"The suffering caused by the tetanic spasms is absolutely frightful to contemplate. The face becomes deadly pale, and the brows get contracted; the skin covering the forehead is corrugated; the eyes are fixed and prominent — sometimes suffused with tears; while the nostrils are dilated, the corners of the mouth drawn back, the teeth exposed, and the features fixed in a sort of grin — the

risus sardonicus. The respirations are performed with difficulty and anguish; severe pain is felt at the sternum; and there is great thirst, but the agony is increased by attempts at deglutition. The pulse, too, is feeble and frequent; the skin is covered with perspiration, and the patient cannot sleep, or if he dozes, it is only for a few minutes at a time. Yet with all this suffering the intellect remains clear and unaffected. Death at length ends the agony, the release being due partly to suffocation and partly to exhaustion." — *Tanner's Practice Medicine, 5th American ed., p.* 460.

The modes of treatment indicated by the disease are: 1st. The removal of any local irritation which may appear to have excited it; 2d. Lessening the general irritability and spasmodic tendency; and 3d. Restoring the tone of the system. The remedies upon which the most reliance can be placed are calabar bean, belladonna, chloroform, quinine and alcoholic stimulants.

Neuralgia. Neuralgia consists of violent pain in the trunk or branches of a nerve, occurring in paroxysms, at regular or irregular intervals. It may affect any of the sensitive nerves, and the pain is generally acute, shooting or darting, with tenderness of the part upon pressure. It is sudden in its onset and abrupt in its termination.

Neuralgia is called by different names according to its seat. Thus: facial neuralgia is called *tic*

douloureux; that affecting one side of the head, *hemicrania;* that affecting the sciatic nerve, *sciatica;* that of the heart, *angina pectoras;* that of the stomach, *gastrodynia*, etc.

The causes of neuralgia are various and generally obscure; they may be either local or constitutional. Facial neuralgia often depends upon decayed teeth; when the teeth are properly cared for the neuralgia disappears. Local neuralgias generally require merely local treatment. Temporary relief from all forms of neuralgia may be obtained by the use of anodynes, but as long as the cause remains, the disease will return. When the disease arises from an enfeebled or impoverished state of the body, tonics, nourishing diet and out-door exercise are to be employed.

VII.—DISEASES OF THE ORGANS OF RESPIRATION AND CIRCULATION.

Catarrh. The term catarrh is used to denote inflammation of the mucous membrane of some part of the air passage. It is the most common of all diseases. When it affects the mucous membrane of the nose it is commonly called "a cold in the head;" but professionally it is known as coryza or nasal catarrh; when the stress of the disease falls upon the trachea or bronchial tubes it is called bronchial catarrh or bronchitis.

It arises, not from mere cold, as is commonly supposed but from too sudden a change of temperature, or from exposure to dampness when the body is overheated or exhausted.

The symptoms of nasal catarrh or cold in the head are a sense of uneasiness, heat, and stuffing in the nostrils, diminution or loss of smell, dull heavy pain in the forehead, inflamed eyes and sneezing. A fluid is discharged from the nostrils which at first is thin and acrid, but which afterwards becomes thick and often purulent. Attacks of catarrh are apt to recur on slight causes in susceptible persons; these repeated and long-con-

tinued attacks of the disease cause chronic inflammation of the nostrils, which is professionally called ozæna, or rhinorrhœa. The mucous membrane becomes thickened and impedes the passage of air, causing great uneasiness or "stuffiness;" but the most troublesome symptom consists of a profuse discharge which is often quite purulent and tinged with blood, and frequently is the cause of persistent hawking, spitting and gagging. Large solid flakes of hardened mucous frequently come away; the smell from which, owing to the rapidity with which they decompose, is often so horribly offensive, and taints the breath to such an extent, that the patient is an object of disgust to both himself and friends. As the disease progresses the sufferer gets miserable, despondent, passes restless nights, his appetite diminishes, his strength fails, and he loses flesh. The septum of the nose often gets eaten through in severe cases, especially when the system is tainted with the poison of syphilis. Fortunately, in most cases, the disease appears in a mild form, or just severe enough to be a source of annoyance.

Probably every one in this climate has suffered from a common cold at some time or other, and thousands at the present time are suffering from chronic inflammation of the nostrils. People generally suppose the disease to be incurable; therefore they make the best of their misfortune, and

perhaps experiment on themselves occasionally by taking quack medicines. Catarrh, however, is curable; but the means used should be adapted to each particular case. What will cure it in one person may aggravate it in another. Judgment and experience are required in the selection of remedies. When catarrh is neglected or improperly treated, it may continue indefinitely. The treatment in most cases must be both local and constitutional. The first hour or two after a cold is taken it may be readily cured by anything that restores the warmth and equalizes the circulation. When we have taken cold by getting the feet wet, we should promptly bathe them in hot mustard water, and use hot drinks to open the pores of the skin that have been closed by the chill. Alcoholic drinks or hot tea made of herbs, when judiciously employed in the early stages of catarrh, are useful in equalizing the circulation, restoring the function of the skin, and relieving chilly feelings. Herb tea is recommended as preferable to the alcoholic drinks for general use, for the patient is apt to find the latter so exceedingly efficacious that he may imagine that he has found a grand panacea for all his afflictions, and be lured on to excess and drunkenness.

A hot air or vapor bath and a ten-grain Dover's powder taken at bedtime, with a mild aperient in the morning, will also cut short a catarrh in its

early stages. Another remedy is the inhalation of iodine vapor every three or four minutes for an hour; each inhalation lasting one minute and being accomplished by merely holding in the warm hands a bottle of the tincture under the nose.

Chronic inflammation of the nostrils requires different treatment from that just suggested for the acute form of the disease. Attention must be paid to the general health, and appropriate medicaments applied directly to the diseased parts. Many obstinate cases can be cured with atomized medicated fluids; others may require the use of the nasal douche, or remedies in the form of powder or ointment. Chemically pure drugs should be used; distilled water is the best vehicle for solutions. Common salt, alum, permanganate potash, tannic acid, sulphate zinc, sulphate copper, acetate of lead, and chloride zinc are among the remedies used in solution with the atomizer and douche. It is best to begin with a weak solution, and gradually increase its strength as the case may require. Relief is often obtained by smoking crushed cubeb berries and letting the smoke pass out through the nostrils; care must be taken, however, not to go out in the cold air immediately after smoking, or the disease will be aggravated instead of alleviated. Change of residence often does great good in old persistent cases.

Bronchitis. Inflammation of the mucous mem-

brane of the bronchial tubes is called bronchitis; it is the most common of the pulmonary diseases and prevails most frequently during the spring months. It is caused by a sudden change of temperature, or by exposure to a cold, moist atmosphere when over-heated, tired, exhausted or debilitated.

Its first symptoms are those of a common cold, accompanied with an occasional cough and a sense of weariness and headache. There is more or less fever, a sense of tightness or constriction about the chest, and hurried respiration with wheezing; and the cough which at first is short, dry and tight, afterwards becomes deeper and looser, with expectoration; the latter being at first a viscid glairy mucous, but subsequently becomes purulent.

Bronchitis may be acute or chronic; the latter is the result of the former, and is generally met with among weakly persons and old people. It differs from the former merely in the mildness of its symptoms and its longer duration. Bronchitis has a tendency to recur again and again, but it is seldom fatal in vigorous middle life; it often assumes a very dangerous character, however, when it occurs in the young, aged and feeble. Deep inspirations, or breathing cold air, excites acts of coughing which occur in paroxysms, and consist of a deep inspiration followed by a series of expiratory efforts. In severe cases, the symptoms

become more and more alarming; the breath becomes difficult from the clogging of the tubes with mucous, and when at last the patient is so exhausted that he ceases to expectorate, he dies of suffocation from the accumulated mucous; death usually occurring between the sixth and tenth days of the attack. With favorable cases the disease begins to decline between the fourth and eighth day, and soon entirely subsides or passes into the chronic form.

Bronchitis can frequently be cut short within the first twenty-four hours, by taking at bedtime a hot mustard foot bath, a glass or two of hot lemonade, a ten-grain Dover's powder, and applying a mustard poultice to the chest. In many cases the writer prescribes instead of the Dover's powder a powder composed as follows:

℞ *Opii pulv., Ipecac pulv., of each, one grain, Potass. nit. pulv. four grains, Camph. pulv. Rad. Glycyrrhiza pulv., of each, two grains.*

Mix, and take at one dose. Children should be given a smaller dose in proportion to their age.

Should the abortive treatment fail or be omitted, a brisk purgative and warm diluent drinks should be prescribed; and then perhaps a saline mixture containing ipecac and squills will be useful; or if there be any depression, a stimulating expectorant should be ordered. Inhalation of the steam

of tar water, or of the steam from an infusion of hops, often soothes the air tubes advantageously. If the cough be very violent, persistent, or frequent, it can be relieved by taking the above prescription in five-grain doses, repeated when required. Should phlegm accumulate in the bronchial tubes, an emetic will remove it. If there is much debility, the system must be sustained by nourishing food, tonics and stimulants.

Chronic bronchitis requires the persevering use of counter-irritation over the chest, and the use of stimulating, alternated with alterative expectorants and tonics. Quinine, iron, and cod liver oil are valuable when the system is below par. Atomized medicated fluids give marked relief in many cases. The patient must guard against everything tending to aggravate his disease. Persistent cases are often benefited by a change of residence.

Pleurisy. Inflammation of the pleura, or investing membrane of the lungs, is called pleuritis or pleurisy. It is most prevalent in winter, and next to that in autumn. It occurs most frequently in the weak, debilitated, and aged, and its most common cause is exposure to cold and wet when overheated, tired or exhausted.

Pleurisy usually commences with chills or slight rigors, followed by fever and an acute lancinating pain directly below the nipple. The pain is commonly called "a stitch in the side,"

and it is increased by a long breath, by coughing, and by pressure. There is usually a short, harsh cough, hot dry skin, and the breathing is frequent, short and anxious. In the great majority of cases the disease effects only one side. Physicians who have had experience in determining the meaning of the sounds produced within the chest, rely more upon the ear than upon the appearance of the patient in diagnosing diseases of the organs within this cavity. When we listen to the painful part of the chest in the early stage of pleurisy, we hear the dry inflamed membranes rubbing against each other, producing a friction sound; but as the disease progresses the sound ceases. The inflammation either terminates in resolution and the two surfaces of the pleura regain their natural moisture and smoothness; or, the inflamed and roughened surfaces becomes adherent; or, they become separated by the effusion of serum, and a form of dropsy known as hydrothorax, results.

In the early stage of pleurisy the pain prevents the sufferer from lying on the diseased side, therefore he lies on his sound side or back; but after effusion has occurred the weight of the liquid would impede the motion of the healthy lung if the patient lie upon that side, and as the pain is now diminished, he lies on his diseased side or back.

In mild cases, or when proper treatment has been adopted at the beginning of the attack, only a small quantity of liquid is effused into the chest, and recovery takes place within a week. The quantity of liquid may vary from a very few ounces to several pints, and when the accumulation is considerable the disease may continue from one to three months. If the pleura be full of fluid there will be dullness on percussion all over the affected side; but if it be only partly filled, we can judge of the quantity by placing the patient in different attitudes, as the fluid will gravitate to the most dependent part and carry the dull sound with it. Although the pain is greatly diminished after effusion has occurred, there is increased difficulty in breathing; this is most urgent when the quantity of effused liquid is considerable and the lung mostly compressed.

Pleurisy is rarely fatal in young and vigorous persons; but when it is met with in children, the aged or debilitated, it may lead to serious results.

In the treatment of pleurisy, the first object is to subdue the local inflammation and prevent effusion. To accomplish this result the sufferer should be kept very quiet in bed, the bowels kept open, and diaphoretics administered. A large, hot, moist, linseed poultice, covered with

the extracts of poppies and belladonna, and applied to the affected side, will probably give greater relief than any other local remedy. In some cases the use of opium, given sufficiently to relieve pain and tranquilize the system, is advisable. Cooling drinks may be taken freely. When the patient is plethoric and pain very severe, the removal of three or four ounces of blood by unloading the congested vessels, often gives relief; blood letting, however, should not be resorted to indiscriminately.

When the abortive treatment has been neglected or failed, and effusion has occurred, we must endeavor to promote absorption. A moderate diet free from stimulants, and the judicious use of iodide of potassium, purgatives and diuretics are recommended. The action of the absorbents may be increased by the application of mustard drafts to the diseased side. The quantity of fluids taken into the system should be as small as is compatible with comfort; if they are taken into the system abundantly the elimination of water is of little or no avail.

Pneumonia. Inflammation of the substance of the lungs is called pneumonitis or pneumonia. It occurs most frequently in the winter and spring months; it may attack persons of all ages, and its average duration is about ten days.

The ordinary exciting cause of pneumonia is

exposure to cold and dampness; but latent tubercle, and the previous state of the health, may predispose to it. The disease may affect one lung or both, or, technically speaking, may be double or single. The right lung suffers from inflammation twice as often as the left; about once in eight cases both are affected.

Pneumonia is characterized by fever, high temperature, dull pain (not always present) in the chest, accelerated and oppressed breathing, cough, occasional delirium, and expectoration by the fourth day of a viscous, rust-colored sputa. The height of the attack is generally reached between the fifth and seventh days; after which the temperature declines, and in favorable cases all the symptoms subside. In unfavorable cases the symptoms become more and more aggravated, until at last the patient dies exhausted or asphyxiated. A high degree of fever attended with delirium, great oppression in breathing, prostration, acute pain and dry cough denote great danger. In fatal cases death seldom occurs before the sixth, and may be as late as the twentieth day.

The first day of an attack of pneumonia, a saline purgative should be administered, followed by sedatives, as aconite or opium in small doses. A hot, moist linseed poultice, with a little oil smeared over its surface, may be applied to the chest; but in cases where counter-irritation is

desired, tincture of iodine or a mustard plaster may be applied. The powder recommended in bronchitis may be taken when the cough is troublesome. Pneumonia belongs to that class of diseases known as self-limited. If uncomplicated, and not attended by accidents, it runs a definite career, ending in restoration, provided the powers of life hold out; therefore the leading, general indication in the second stage of the disease is to support the powers of life. The supporting treatment embraces a nutritious diet, tonic remedies, and alcoholic stimulants.

Phthisis or Consumption. Phthisis, or pulmonary consumption, is a disease which leads to ulceration and destruction of the lung tissue. Persons of all ages, and both sexes, are liable to its attack, which at first is usually so insidious as almost to escape notice. Phthisis is generally caused by the deposit of scrofulous matter in the substance of the lungs. The deposit takes place in the form of small, gray, semi-transparent granules, called tubercles, which gradually enlarge, become opaque, and at length soften and acquire the consistence and appearance of pus, or matter; they communicate with each other, and gradually destroy the substance of the lungs, and empty into the bronchial tubes or air passages, and pass off by expectoration.

The predisposing causes of phthisis are hereditary

tendency, sedentary employments, exhausting excesses and bad hygienic conditions. The exciting cause is often an attack of bronchitis, or pneumonia, or some eruptive fever, or inhaling irritating substances, as dust, fine particles of metal, coal, stone, etc. Inhalation of irritating substances is incidental to certain occupations.

The earliest symptom of phthisis or consumption that usually manifests itself, is a slight, dry, hacking cough, exciting but little or no attention, or perhaps attributed to a slight cold. After an indefinite period expectoration, at first small, and consisting of foamy or glairy mucous occurs. The cough gradually becomes more frequent, and is particularly troublesome during the night; the expectoration progressively increases, becoming more or less abundant, viscid and opaque. Spitting of blood, or slight hemorrhage from the lungs, frequently takes place shortly after the occurrence of cough and expectoration. In some cases it precedes these symptoms, and it is usually the event which first excites uneasiness in the mind of the patient. As the disease advances, the breathing and pulse become more hurried, and the patient becomes languid, indolent, and gradually loses strength. Weakness of the voice, or hoarseness, is not uncommon. Towards evening there is frequently experienced a slight degree of chilliness, followed by slight fever and nocturnal

perspirations. The cheeks may occasionally present a circumscribed flush, and the palms of the hands, and the soles of the feet, may at times be affected with a burning heat. The patient becomes emaciated, weakness increases, and a pain is felt in some part of the chest, which is increased by coughing, and may become so acute as to prevent the sufferer from lying on the affected side. The feet and ankles begin to swell, and in the last stage of the disease there is nearly always profuse diarrhœa. The countenance now assumes a cadaverous appearance; the cheeks are hollow, the bones prominent, the eyes sunken, the nose sharpened and drawn, the lips retracted so as to produce a bitter smile, the hair thinned by falling out, and the emaciation can be almost seen to advance daily. Cases differ in regard to the desire for food, and the ability to digest it; but as a rule, the appetite and digestion are more or less impaired. The intellect usually remains bright and active, and the feelings are usually cheerful and buoyant, notwithstanding the progress of the disease. Patients often take offence at an intimation that they are consumptive, and even when informed by a competent physician, generally think him mistaken. They are hopeful respecting their condition, and are easily persuaded that they are improving; therefore they fall an easy prey to quacks.

The duration of phthisis or consumption depends upon a great variety of circumstances, and varies from a few months to several years; the average duration being about two years. The disease is known as "quick consumption" when it runs a rapid course, passing through its changes and destroying life in a few weeks or months.

Consumption can often be contracted by inhaling the breath of those afflicted with the disease; therefore no one should be allowed to sleep with a consumptive patient. In the earliest stages of the disease its further development may in certain cases be prevented by skilful treatment; but after the disease has been neglected and allowed to become fully established, little except palliation can be effected.

The most important part of the treatment is hygienic. The progress of consumption may frequently be suspended by change of residence, diet, habits and occupation. The prevalence of the disease is less in climates either uniformly warm and dry, or uniformly cold and dry, than in those which are moist and subject to frequent alternations of cold and warmth.

The diet of consumptives should be generous as regards quantity, quality and variety; the appetite should be encouraged, as the object is to nourish the body to the fullest possible extent. Exercise in the open air, or an out-of-door life, is

of paramount importance. The body should be properly protected against atmospherical changes, and the mind pleasantly occupied.

The two medicines which have been found most useful in the treatment of this disease are cod liver oil and alcoholic stimulants; the former is frequently administered in connection with the hypophosphites; but a formula frequently prescribed with good success by the writer is as follows:

℞ *Cod Liver oil; Bourbon whiskey (best quality); of each, one half pint. Tinct. of Iodine, three fluid drachms.*

Mix, and take one tablespoonful after each meal. Always shake the bottle before the medicine is poured out.

The complications of consumption should be treated as they arise. Excessive coughing may be relieved by small doses of morphia; hemorrhage from the lungs, by fluid extract ergot; night sweats, by aromatic sulphuric acid (see "Sage Tea"); and the diarrhœa by astringents and opiates.

Asthma. Contraction of the circular fibres of the bronchial tubes by obstructing the passage of air, causes difficulty in breathing, accompanied by a wheezing noise and a feeling of tightness across the chest; this condition is called asthma.

The attack occurs in paroxysms usually about three or four o'clock in the morning. The patient is suddenly awakened from sleep, gasping

for breath, and is obliged to assume an upright posture to prevent suffocation. The pulse is small and feeble, the eyes staring, the countenance anxious, the skin cold and clammy, and the patient is in such distress that he perhaps thinks he is about to die. The disease is rarely fatal, however, and the symptoms usually subside in two or three hours.

The disorder is called humid or humoral asthma when the attack ceases with expectoration, and dry asthma when without it; both forms are often connected with an affection of the respiratory organs and with disease of the heart. When the attacks are merely nervous, the patient enjoys moderately good health during the interval that elapses between one asthmatic paroxysm and the next.

Asthma afflicts men more frequently than women; is hereditary in the majority of cases, and may occur at any age, though most common about the middle period of life. The objects of treatment during an asthmatic paroxysm are to lessen the suffering and bring the paroxysm to an end as speedily as possible. To accomplish these results anti-spasmodic medicines and gentle aperients are required.

There are various anti-spasmodic medicines, each of which proves efficacious in some cases, but not in others. Wine of ipecac and tincture of lobelia,

mixed in equal proportions, and taken in half-teaspoonful doses every twenty or thirty minutes until nausea and expectoration occurs, is an old remedy; it is valuable in some cases, but useless in others.

Smoking stramonium leaves, or inhaling the smoke of burning bibulous paper which has been soaked in a saturated solution of saltpetre, acts like a charm on many persons when afflicted with the disease; and often inhaling the vapor of chloroform or ether will relax the spasm, the patient passing from a condition of great suffering to one of ease and comfort in a few moments; but care is required in the use of chloroform and ether, and they should be administered only by a competent physician. Compound spirits of ether, tincture of henbane, hydrate of chloral, and hot mustard foot baths, all have their value when properly used.

To prevent the return of a paroxysm, the nervous system should be invigorated, the general health improved and the exciting causes of the disease avoided. The emanations from hay, feathers, etc. excite paroxysms of the disease in certain persons, who of course should avoid exposure to these causes.

Croup. Croup is an acute inflammatory disease of the trachea, or often of the glottis larnyx and trachea, which generally occurs in children between

the ages of one and seven years. It occurs most frequently in cold, damp, changeable climates, and is one of the most dreaded and fatal diseases with which children are afflicted.

There are two kinds of croup; true and false. True croup comes on gradually, and is less likely to excite alarm than false croup which comes on suddenly. True croup is accompanied by fever, and the exudation of false membranes upon the affected mucous surfaces. False croup — spasmodic closure of the glottis, causing shrill breathing — is not accompanied by fever or the exudation of false membranes. It is rare for true croup to recur in the same individual; false croup is apt to recur again and again. The average duration of true croup is from two to five days; false croup lasts only a few moments or few hours. About half of the cases of true croup end fatally; false croup seldom ends fatally, and those not familiar with the disease are often astonished to find the next morning the little sufferer of the night before playing about as lively as ever.

Genuine croup is not as common an affection as is generally supposed. The majority of the cases of so-called croup are nothing more than spasm of the glottis or false croup. Relaxation and secretion are the two great desiderata in the treatment of either true or false croup, and more depends on early treatment than in any other

disease. Emetics and anti-spasmodics, as ipecac, alum or lobelia, when judiciously used, and especially when aided by a hot foot bath, give relief in most cases. The child must be kept in a warm room, and in true croup, the inhalation of steam from water poured upon unslacked lime, and hot fomentations to the throat, often does much good. A saline purgative may be given if required. The strength of the patient must be sustained by a nourishing diet, and when necessary, the cautious use of stimulants. Cases in which medicines fail to remove the obstruction from the upper part of the air-passage, physicians sometimes save life by performing an operation called tracheotomy, which consists of cutting into the trachea for the purpose of admitting air into the lungs; a small silver tube is introduced into the opening made, through which the patient breathes.

Whooping cough. Whooping cough, like croup, is especially a disease of childhood. It is infectious, and after an incubation of about six days, it commences with symptoms resembling those of acute bronchitis. A peculiar, hard, convulsive cough soon appears; it occurs in paroxysms at uncertain intervals; it consists of a rapid succession of short, but violent, expiratory efforts, and there is scarcely any interval of inspiration; the air is so largely expelled from the lungs that

the patient seems on the point of being suffocated when the air is taken in by force through the contracted glottis, causing the characteristic whooping noise. The paroxysms of coughing end in expectoration of a ropy gelatinous phlegm, like albumen, or often in vomiting, or sometimes in complete exhaustion. The child generally appears well and plays about in the intervals between one fit of coughing and the next.

The duration of whooping cough varies from three weeks to several months, but it is rare for it to recur in the same individual. Complications, as bronchitis, pneumonia, etc., sometimes occur. The disease is most dangerous in the youngest children; it is more serious when epidemic and when it attacks an unhealthy child. Those afflicted with the disease should avoid sudden changes in temperature and exposure to dampness.

"Hygienic measures form an important part of the treatment. If there be no complications which interfere with exposure to the open air, this should by all means be advised and enforced. Under proper prudential restrictions, the more out-of-door life the better. The diet should be nutritious. If from the frequency of vomiting the system suffer from innutrition, alimentation becomes an important object of treatment. The patient should take food as often and as soon

after a paroxysm as possible." — *Flint's Practice Medicine, 3d ed. p. 237.*

Various medicines have been used and recommended in the treatment of this disease. Those upon which the most reliance can be placed are ipecac, belladonna, hydrate chloral, bromide potash, morphia, lobelia and chestnut-leaves, all of which when properly used are doubtless more or less curative in a certain proportion of cases. An infusion or fluid extract of chestnut-leaves it is said will control the paroxysms in a remarkable manner, and in some cases suspending them entirely after the lapse of a few days.

Diphtheria. Diphtheria is an acute, specific, infectious and contagious disease, characterized by a spreading, asthenic inflation of the mucous membrane of the throat and the exudation of false membranes on the tonsils and adjacent parts.

It usually occurs epidemically; it is very rare in old age, and is not frequent among adults; it attacks chiefly children. It may recur in those who have once had it, and some individuals and families have a greater predisposition to it than others.

After the period of incubation, which generally is from two to five days, the symptoms of diphtheria commence very gradually with feelings of depression, muscular weakness, headache, furred tongue, nausea, slight fever and painful degluti-

tion. The tonsils become swollen and dark colored, and the glands about the angles of the lower jaw get tender. The false membrane first appears in the form of white or gray spots on the tonsils or pharynx; these spots by their enlargement and coalescence form patches of considerable size, which gradually extend forward to the soft palate and into the nostrils, or backward into the esophagus or larynx. The false membrane increases in thickness as the disease spreads; and although at first it is of a white or gray color, it soon becomes brown or almost black, and of an offensive odor. If it be forcibly removed the surface beneath is seen to be red and bleeding, and in a few hours becomes covered with a fresh layer. The tonsils may suppurate or even slough, and when the nostrils become involved and lined with false membrane, they become swollen and emit an acrid and fetid discharge. Hemorrhage frequently occurs; there is usually, also, a low and dangerous form of fever, with great depression of spirits and rapid decrease of the patient's strength, which is still further accelerated by his inability to take food. The duration of the disease in favorable cases is from ten to fifteen days. Termination in death or in recovery generally becomes apparent in seven days. Membranes must not be torn off, neither must they be removed until they become

partly loosened; then an emetic will remove them.

Diphtheria varies greatly in its general characters. That form of the disease just described is known as the malignant variety which ends fatally in the majority of cases. It does not always appear in this severe form. Frequently the general and local symptoms are trifling, attended with but little fever, but little soreness of the throat, but slight difficulty in swallowing, and no nervous symptoms. The disease is then known as the simple variety; it is not very dangerous to life.

That form of the disease known as the croupous variety, which often follows measles or scarlet fever so closely as to seem one of their latter stages, is very fatal.

Various modes of treating diphtheria have been recommended, but it is impossible to lay down a routine treatment appropriate to all cases. The hygienic management of the case — cleanliness, ventilation and disinfectants should receive first attention. The nourishment of the patient is a matter of very great importance, and the strength is to be supported by means of tonics and stimulants. The remedies employed should be administered as early as possible, in suitable doses and at proper intervals. The treatment is frequently of no service, because it has been commenced too late. When the patient is unable to swallow, remedies may be administered by enema, or

hypodermically; the local treatment is also important. High fever should be reduced by sponging and baths. Of the various medicines used, internally and locally, chlorate potash, tincture chloride of iron, carbolic acid and alcoholic stimulants are the most important.

Diseases of the Heart. The heart is subject to two classes of diseases; viz.: functional or nervous, and structural or organic. The former is merely a disturbance of the heart's action, caused by sympathy of reflex action; but the latter is connected with actual morbid changes in the heart's structure.

To determine whether a person is suffering from disease of the heart, and whether the disease be functional or structural, we rely chiefly upon auscultation and percussion, or what is commonly known as "sounding the chest." The heart being excluded from vision, but little knowledge of its condition can be obtained by inspection; therefore the ear is the only reliable means of detecting the existence of its various diseases. The heart gives out two sounds, which have been compared to the two syllables *lupp*, *dupp*; any manifest alteration in these sounds is indicative of the existence of disease; they may be high or low, clear or dull, muffled, rough, intermittent, etc. Murmurs or regurgitant sounds may arise from disease of the valves. The power of distin-

guishing between the normal and abnormal sounds of the heart, and of the causes producing the latter, can only be obtained by prolonged experience; therefore those who wish reliable information as to whether their heart is healthy or diseased should consult some skilful and honorable physician who is practised in the arts of auscultation and percussion.

Chief among the functional diseases of the heart are palpitations, syncope or fainting, and angina pectoris. They are chiefly met with in persons of a nervous temperament, and may be induced by excessive mental excitement, dyspepsia, or general nervous debility. The exciting cause of the disorder should be removed, if possible, and the general health improved by means of tonics, sea-bathing, and moderate exercise in the open air.

Chief among the structural diseases of the heart are pericarditis, endocarditis, fatty degeneration, hypertrophy, dilatation and disease of the valves. Pericarditis, or inflammation of the membrane covering the heart, may be induced by exposure to cold and dampness, and is a frequent attendant of acute rheumatism. Endocarditis, or inflammation of the lining membrane of the cavities of the heart, may be induced by the same causes. Fatty degeneration of the heart, the substitution of fatty substance for muscular tissue, may be

induced by any exhausting or depressing cause. Confirmed drunkards are apt to have fatty degeneration of the heart, as it may be caused by the excessive and prolonged use of alcoholic liquors. Hypertrophy, or enlargement of the heart, may be induced by valvular obstruction, regurgitation compelling unusual and continued effort to sustain the circulation. Dilatation of the heart is when one or more of the cavities are enlarged in size without the substance of the heart itself being increased. It may depend on a debilitated state of the heart's muscular tissue, or on valvular disease, or on obstruction beginning in organs remote from the heart. The valves of the heart are subject to a variety of diseases which interfere with their proper action.

Those afflicted with heart disease in any of its forms should avoid excitement, anxiety and rapid or excessive exercise. Violent effort or emotional excitement may be suddenly fatal. The medicines used will depend upon the particular symptoms presented.

VIII.—DISEASES OF THE ALIMENTARY CANAL.

Mumps. Mumps, or parotitis, is an acute, contagious, specific inflammation of one or both parotid glands. It generally occurs but once in a lifetime, and most frequently in children about five years of age.

It commences with slight feverish symptoms and swelling about the angle of the jaw; the parts in the immediate vicinity of the parotid gland soon becoming hot, painful, and tender to the touch. There is pain in mastication, deglution and articulation. The disease reaches its height in four days, and then declines and gradually disappears.

As mumps is generally a mild affection, it requires but little treatment. The patient should avoid sudden changes in temperature, cold and dampness. A mild laxative may be taken, if required, and a warm flaxseed meal poultice may be applied to the swollen parts; but in most cases no local application is necessary.

Tonsilitis or Quinsy. Inflammation of the tonsils, tonsilitis or quinsy, commences with chilli-

ness, followed by feverishness, a flushed face and a husky voice. The tonsils soon become inflamed, swollen, painful, and great difficulty is experienced in swallowing — liquids sometimes returning through the nostrils.

The disease is caused by exposure to cold and wet, or sudden changes in temperature, and under ordinary circumstances the inflammation runs an even course, and terminates favorably in a few days; the tonsils, however, are left temporarily swollen or permanently enlarged. When the inflammation is very severe and prolonged, the pain is very constant and throbbing, and the morbid action frequently leads to suppuration in one or both of the glands.

In the treatment of tonsilitis the bowels should be kept gently open; flaxseed lemonade freely used as a drink; hot fomentations or linseed poultices applied to the throat; and a solution of chlorate of potash used as a gargle. Should the enlargement of the tonsils become chronic, they should be painted daily with tincture of iodine, and the syrup of iodide of iron may be administered internally.

Dyspepsia. Dyspepsia means literally difficult digestion. Its chief symptoms are a sense of fulness, weight and uneasiness at the stomach, especially after taking food, eructations, heartburn, nausea, foul tongue, bad taste in the

mouth, headache, palpitation, restless nights, tired feeling on waking, drowsiness, irregular bowels and loss of appetite, or capricious appetite, with particular aversion to fat or oily substances, and sweet or insipid articles of diet. These symptoms, however, vary greatly in their severity; one individual suffering severely when his food "disagrees" with him, while another has merely slight depression. One of the worst of the occasional concomitants of dyspepsia is that state of mind which is known as hypochondriasis. There is languor, listlessness, gloomy forebodings, want of resolution, and an apprehension of some great evil in the future.

Dyspepsia may be caused by anything which interferes with the healthy action of the stomach and intestines. Its most frequent causes are overloading the stomach, especially with improper food, or when followed by violent exercise, imperfect mastication and hurry in eating, great anxiety or emotional excitement immediately after meals, excessive use of alcoholic liquors, opium, tobacco, coffee, or medicine out of place, and sedentary habits.

In the treatment of dyspepsia it is of the utmost importance that those habits which have generated the disorder should be discontinued. The quality of the food should be attended to, and the quantity of it introduced into the stomach should be kept within the limits of its capacities

and powers. The proper regulation of the diet alone will often effect a cure. (See Digestion, and Facts and Fallacies Concerning Eating and Drinking.)

The use of medicines, although of secondary importance, is often useful and absolutely essential. Perhaps the most valuable is pepsine, the digestive principle of the gastric juice. It should be taken at meal time in doses proportioned to the necessity of the case. In some instances, where pepsine alone fails, the troublesome symptoms may be relieved by the simultaneous use of a small quantity of the dilute hydrochloric acid, or about the one seventh of a grain of the hydrochloric of morphia, or when great atomy prevails, the one twenty-fourth of a grain of strychnia. There are other medicines, such as nitro-hydrochloric acid, rhubarb and ginger, which increase the gastric secretion; the first, when given in small doses well diluted, is often especially useful. If you wish to restrain undue secretion, moderate doses of aromatic sulphuric acid, bismuth, conium or opium may be administered; but if there be an excessive secretion of acid, alkalies are needed.

Wine and well-diluted spirits are often very beneficial to the dyspeptic, *provided that they be taken in strict moderation and only at meal-time.* There is considerable "wear and tear" in waging the battle of life, and the digestive organs

are the first to sympathize with the terrible anxieties, intense disappointments or depressions of the mind, as well as with the fatigues of the body; therefore the precept furnished by St. Paul to Timothy — . . . "Use a little wine for thy stomach's sake and thine often infirmities" — may be adopted with advantage by many persons. Care must be taken, however, to avoid taking too much. It should be remembered that the effect of alcoholic drinks on most persons, is such that it is easier for them not to drink at all than it is to use the spirits moderately; therefore, perhaps on the whole, it is best to abstain from their use entirely.

Diarrhœa. Diarrhœa is a disease characterized by more frequent and thinner evacuations from the bowels than natural. It is more apt to occur during the summer and autumn months than at any other period of the year; and it may be occasioned by anything that stimulates or irritates the mucous surface of any portion of the alimentary canal. The most frequent cause of the disease is error in diet. It is also a symptom of many different diseases.

The symptoms of diarrhœa, in addition to purging, are nausea, furred tongue, foul breath, flatulence, acid eructations, griping pains, and, if the disease is not checked, great emaciation.

Children are more subject to diarrhœa than

adults; it is especially prevalent during dentition, and it is the most prominent element of the affection known as cholera infantum, or summer complaint.

Diarrhœa is one of those diseases by means of which nature strives to get rid of impurities and restore the system to its normal condition; therefore care must be taken not to check it too suddenly.

The treatment of diarrhœa should vary with the cause. When it arises from the presence of some offending matter in the intestinal canal, the expulsion of such matter must be aided by administering a mild dose of rhubarb or castor oil. If the diarrhœa continues after the bowels have been freely evacuated, the irritation may be subdued by the use of a mild anodyne, as paregoric combined with chalk mixture, or astringents. Kino, catechu and krameria are familiar as pure astringents. Bicarbonate of soda, with ginger or cinnamon, etc., will often relieve the condition of the alimentary canal in which diarrhœa originates without the use of astringents. Lime water, with cinnamon or camphor water, will often correct mild cases of diarrhœa in infants. When more severe aromatic syrup of rhubarb, either alone or combined with paregoric, may be given. The diet for a day or two should be simple or somewhat restricted. Vegetables and fruits should be

avoided. Toast water had better be used as a drink in preference to ordinary cold water.

Dysentery. Dysentery is a disease characterized by frequent mucous or bloody stools, attended with straining and griping pains in the abdomen.

It is distinguished from diarrhœa by its greater severity, the presence of blood in the discharges, and in the retention of the natural fæces, or in their being expelled from time to time in small hard separate lumps.

Dysentery consists essentially of an inflammation of the large intestine, involving the muscular as well as the mucous coat. There is fever in most acute cases and a tendency to great prostration. The disease is very prevalent and fatal in hot climates and tropical countries at certain seasons of the year. It may be caused by errors in diet, foul air, impure water, extreme alternation of heat and cold, and exposure to the dews of night, particularly after fatigue.

Severe and protracted cases of dysentery go through two stages — the inflammatory and ulcerative. Chronic dysentery differs only in degree from the acute form, and arises from the same causes, but it presents nearly always ulceration of the rectum or colon or both.

In the treatment of dysentery, perfect rest in bed in a well-ventilated apartment, is desirable in

all cases. At the commencement of the disorder the old practice of administering a dose of castor oil with ten or fifteen drops of laudanum is advisable; it clears the bowels of irritating substances; but when it is neglected and the disease has continued a day or two, it had as a rule better be omitted; opium may then be administered either alone or in combination with ipecac. The subnitrate or the subcarbonate of bismuth, the acetate of lead and the various vegetable astringents are also useful in many cases. The diet must be as purely nutritious as possible; the object being to leave but little residuary matter, after digestion, to pass into the large intestine. Rice-water, arrowroot, milk, beef-tea, etc., are recommended. An infusion of slippery-elm bark may be used as a drink to quench thirst. If the symptoms denote failure of the vital powers, concentrated nourishment should be given freely with such quantity of alcoholic stimulants as may be required to rally the vital energies. For chronic dysentery the patient must seek relief in a mild, dry, equable climate. Tonic remedies may be given with advantage during convalescence.

Cholera. Cholera is generally divided into two species; viz., sporadic cholera, or cholera morbus as it is commonly called; and malignant or Asiatic cholera. Cholera of either species is most common in warm climates; excessive heat predisposes to it.

Cholera morbus apparently arises from an excess or acrimony of bile. Warm weather by relaxing the mucous membranes and exciting the liver, acts as a predisposing or indirect cause of the disease. The exciting or direct causes may be improper food, such as unripe fruits, etc., or sudden changes of temperature, or suppressed perspiration.

An attack of cholera morbus is often abrupt, and is ushered in by vomiting and purging, occurring in quick succession and recurring either simultaneously or in close alternation. The food in the stomach is first discharged; then a fluid varying in color, but always containing bile, is thrown up in great abundance; the evacuations from the bowels also contain bile. Severe pains generally attend the acts of vomiting and purging, and in the intervals between the acts the patient usually suffers from dryness of the mouth and fauces with urgent thirst. There is great anxiety, restlessness and exhaustion, but the disease runs a rapid course, and in favorable cases the distressing symptoms gradually subside in the course of several hours when properly treated. In more severe cases the symptoms acquire a more alarming character, and may continue two or three days; extreme exhaustion ensues, attended by depression, hurried respiration, cold sweats, hiccough, feeble pulse, etc. Death may then occur. The vast majority of cases, however, terminate favorably. When

this disease occurs in infants it is called cholera infantum, or summer complaint.

In the treatment of cholera morbus, a large mustard plaster should be placed over the abdomen; and after it has reddened the skin a spice poultice, composed of equal parts of ginger, cloves, cinnamon and flour moistened with alcohol, may be applied.

There are various "cholera mixtures" that are quite popular with the general public. Some are useful, but the majority of them are useless and injurious. Of those that are useful the following will perhaps be found best adapted to relieve the troublesome symptoms. Take of tincture of ginger, opium, capsicum, rhubarb and spirits of camphor, equal parts. Mix. Dose from twenty to sixty drops in water every half-hour until relieved. Ice may be given if the thirst be great. Extreme prostration may require the use of brandy internally. To check the purging when threatening collapse a teaspoonful of laudanum mixed with a little thin starch should be injected into the rectum. Care as regards diet is necessary during convalescence.

Malignant or Asiatic cholera is a term applied to a most appalling form of pestilential disease, which has carried off millions of human beings. Its attack is sudden, often without warning, and the patient is frequently a corpse in a few hours.

Purging and vomiting are the first symptoms. The discharge from the bowels is a thin colorless fluid, like rice water, and is spurted out with spasmodic force. There is great prostration, cold clammy sweats, and terrible cramps. The body becomes bent, the limbs twisted, the countenance cadaverous, the pulse almost imperceptible, the eyes sunken and surrounded by a dark circle, and the patient sinks into a state of apathy and soon expires unless a favorable change speedily takes place.

As regards the treatment of malignant cholera the best advice that can be given is to procure the services of a competent physician without delay; while awaiting his arrival the treatment suggested for cholera morbus may be adopted.

Colic. Colic is characterized by severe griping pain and a sense of twisting, especially about the navel, occurring in paroxysms. The bowels are constipated, and there may be slight nausea and vomiting.

Colic may be caused by indigestion, accompanied with flatulence; or by the presence in the bowels of morbid secretions or of retained excrementitious matter; or by the slow cumulative action of mineral poisons such as copper, lead, etc. There is also what is called nervous or spasmodic colic, which results from fright, cold, hysteria, gout, etc.

The treatment of colic will in each case depend very much upon the cause. In most cases the first object is to procure an evacuation of the bowels by mild and unirritating aperients. If the stomach contain irritating substances an emetic should be given to remove them. To relieve the pain and spasm a mustard plaster or hot fomentations may be applied to the abdomen ; and chloral, chloroform, morphine, or some similar remedy, may be administered internally.

Lead colic, copper colic, etc., can only be cured by the elimination of the poisonous snbstances which cause the colic, from the system ; to accomplish this the bowels must be kept open, and such remedies administered as existing circumstances may indicate.

Constipation. An insufficiency of evacuations from the bowels is called constipation or costiveness. It may be caused by an excessive action of the absorbents of the bowels, or defective secretion of the juices of the intestines, by which the fæces become hardened, or by an impaired peristaltic action of the intestines. It exists as a functional disorder, and is incidental to various affections. It arises most frequently from a deficiency or vitiated secretion of the bile, which is the natural stimulus of the bowels. Sedentary habits and the use of certain kinds of food predispose to it.

The treatment of constipation involves management as well as medicines. The bowels may be opened by means of purgatives, or injections of warm water or warm soapsuds, after which the natural state of the system should be restored by the use of food of a laxative nature, open air exercise, bathing, etc. It is well also to have a regular time to endeavor to empty the rectum; but severe straining should be avoided, as it tends to induce piles.

Intestinal Worms. The worms occasionally found inhabiting the human intestinal canal are of seven different kinds; and the number of parasites met with in the human body exceeds thirty. There is scarcely a tissue or organ in which they are not known to lodge and nourish themselves.

The eggs and larvæ of the worms gain admission into the stomach with impure drinking water, and also through the use of raw or insufficiently cooked food, especially pork.

The presence of worms in the bowels produce various symptoms, such as itching of the nostrils and anus, voracious or impaired appetite, foulness of the breath, bluish circle round the eyes, disturbed sleep, grinding the teeth at night, swelling of the abdomen, and irregular bowels; but the only reliable sign is the passage of some of the worms, or portions of them, in the fæces.

The expulsion of intestinal worms is generally effected by the administration of anthelmintic remedies and brisk purgatives. Santonine, worm-seed, pinkroot, oil of turpentine, male fern, kousso and pumpkin-seeds are some of the anthelmintics frequently used for the destruction of worms. The remedy used is most likely to be effective when the bowels do not contain an accumulation of fæces or partially digested food, and when the vigor of the parasite is reduced by a low and simple diet. Those affected with worms should use plenty of salt with their food.

IX.—DISEASES OF THE LIVER.

The greater number, and by far the more important of the affections of the solid abdominal viscera, are seated in the liver; but as there are symptoms and signs which are common to many diseases, it is difficult for a person inexperienced in diagnosing diseases to determine to which of its many sources a particular symptom ought to be referred; therefore, symptoms depending upon disease of the stomach, intestines, kidneys or heart, are often ascribed to derangements of the liver; and we frequently hear people say that they are "very bilious," or their "liver is out of order," or that they have "the liver complaint," when in reality their liver may be perfectly healthy.

The position of the liver in health, its weight, function, etc., have been described under the head of "The Liver." The organ is liable to displacement by tight lacing, by rickets, by fluid in the pleura, or pericardium, by a large and dilated heart, and by tumors in the chest. Displacement can only be ascertained by those experienced in the art of percussion, and must not

be mistaken for enlargement. The diseases which lead to enlargement are congestion, hypertrophy, inflammation, abscess, fatty degeneration, tumors and cancer; and also enlargement of the gall-bladder, which may be due either to an accumulation of bile, owing to some impediment to its escape into the intestine, or to inflammation of the coats followed by suppuration, or to cancerous infiltration of the walls, or to the presence of gall-stones. The liver diminishes in size and weight when affected with the disease known as "atrophy," which is a very fatal affection.

A detailed account of the various diseases of the liver will not be given by the writer, as it would be of no special interest to the general reader. One of the most frequent causes of disease of this organ is the excessive use of alcoholic drinks, especially those undiluted, as they are more rapidly absorbed from the stomach than those mixed with water, and consequently produce much greater irritation of the liver. That condition of the liver called "hob-nailed," but professionally known as "cirrhosis," is one of the most common results of continued intemperance. It generally occurs in those beyond the middle period of life, and recovery from it is not to be expected. It usually ends fatally within a year or so, and all that can be done is to modify the severity of its symptoms by appropriate treat-

ment. Drunkards are also apt to have "fatty livers," which form of degeneration is common in those suffering from prolonged debility.

Congestion of the Liver. Congestion of the liver is the initiative step in almost all the structural diseases of this organ. It may result from some disease of the heart or lungs which obstructs the circulation of blood through the hepatic and portal viens; it is also caused by high living, malarious influences in hot climates, the excessive use of alcoholic drinks, and functional disorder of the liver itself. Temporary congestion of the liver often follows violent exercise — particularly exercise soon after meals; and to this is probably due that sudden "side ache," or "stitch in the side," which is often experienced and which compels the sufferer to rest a few minutes.

The symptoms of congestion of the liver are a sense of weight and fulness in the vicinity of the organ, nausea, foul tongue, headache or dizziness, slight jaundice and torpor of the bowels. The treatment consists in causing a drain from the portal system by the use of saline purgatives.

Inflammation of the Liver. Inflammation of the liver is particularly common in tropical regions, and often occurs in temperate climates. It is attended by pain in the region of the liver, which is increased on pressure, deep inspiration or cough. There is inability to lie on the left side,

difficulty in breathing, vomiting, cough, hiccough, a yellow tinge to the eyes, and sometimes jaundice.

When the inflammation is deep-seated and confined to the substance of the liver, the pain is dull and tensive; but when it extends to the surface of the organ, or is seated in the peritoneal covering, the pain is sharp and lancinating. The disease often ends in abscesses which sometimes require to be opened externally. When inflammation of the liver has supervened in a warm climate, a removal to a more temperate region is always advisable. The medical treatment is complicated, and professional assistance is necessary. After the disease has been subdued, vegetable tonics are useful in restoring the digestive powers.

Gall-stones. The gall-bladder is liable to have a number of calculi or gall-stones of various sizes and shapes, but usually about the size of a pea, formed in its cavity from the salts of the bile. The passage of these biliary formations through the duct, from the gall-bladder to the intestines, is attended with acute and distressing pain. When the calculi with its jagged and rough edges, gets past the neck of the bladder and into the duct, spasmodic contraction of the latter occurs, causing sudden paroxysms of pain, so severe that the sufferer may be semi-collapsed; intervals of relief succeed the pain. The attack is usually

accompanied by nausea, vomiting and profuse perspiration. If the gall-stone escapes into the intestines, immediate relief follows, and if it be true as some philosopher has remarked, that the height of happiness is sudden relief from great suffering, the patient is indeed a happy man. If the gall-stone does not escape into the intestine, jaundice is developed by its obstructing the passage of bile.

Most people are never afflicted with these attacks, but certain persons are particularly liable to them. They are commonly known as "bilious colic."

The treatment consists in relaxing the system as quickly as possible; allay the pain by the use of anodynes, and, if it can be effected, expand the biliary duct by means of a hot bath.

Jaundice. Jaundice is characterized by yellowness of the skin, eyes, and tissues generally, from impregnation of bile pigment. It is often spoken of as a separate disease, but is, in fact, only a symptom of disordered action of the liver. It is generally produced by some impediment to the flow of bile into the intestine, and the consequent absorption of the retained fluid into the blood.

The yellow color appears first in the eyes, then the face, neck, chest, and finally the entire body becomes imbued with it. The shades of yellowness vary from a light yellow to a deep orange hue, and in some cases greenish or almost black.

The latter varieties are the most dangerous, and are known as green or black jaundice.

Jaundice may be developed gradually or suddenly. In the former case the yellowness of the skin is preceded by headache, loss of appetite, nausea, irregular bowels, or constipation, colic, pains, languor, etc. With sudden attacks the yellowness is the first symptom. The urine acquires a saffron color as the disorder advances, and the fæces a light clay color. There is usually a troublesome itching or tingling sensation of the surface of the body, a bitter taste in the mouth, furred and yellow tongue, thirst, drowsiness, giddiness, peevishness and exhaustion.

The duration of jaundice varies from a few days to several weeks. When acute, it is not very often fatal; but when it lasts a month or two, and when acute, yellow atrophy of the liver exists, there is always danger connected with its organic cause.

In the treatment of jaundice the object is to promote the secretion of bile, and favor its removal. In that form of the disorder which is independent of obstruction of the bile duct, this is best accomplished by the administration of cathartics. Alkalies, and their salts, with the vegetable acids, are also useful, partly in correcting acidity of the stomach, but mainly by carrying off by the kidneys the products of blood and

tissue metamorphosis, the presence of which in the blood is the probable cause of the languor and other symptoms from which the patient suffers. Fermented liquors, wine, spices, fat and all rich or indigestible articles of diet which are calculated to irritate or congest the liver, must be avoided. When the jaundice is dependent upon obstruction of the bile ducts, warm baths and opiates are useful.

X. — DISEASES OF THE KIDNEYS.

The structure and functions of the kidneys have been described under the head of "The Kidneys." These organs are subject to a variety of dangerous and painful diseases, which may be arranged in two distinct classes; viz.: those which are the result of some cause acting locally, and those which are the result of a constitutional cause.

Retention of urine, calculus or gravel, and external violence, are local causes. Scrofulous disease of the kidneys, cancer, hydatids, etc., are produced by constitutional causes.

Inflammation of the kidneys, professionally called nephritis, like other inflammatory diseases, results from cold, wet, sudden changes in temperature, intemperance, etc.

Bright's Disease. Structural disease of the kidneys, characterized by albuminuria and dropsy, is called "Bright's disease," because Dr. Bright, in the year 1827, was the first to draw attention to the existence of this singular affection. Since his time, it has been shown that not one kind, but many different structural alterations of the

kidneys, are connected with albuminuria and dropsy.

Bright's disease may be the result of congestion, of acute inflammation, of albuminoid changes, of cirrhosis, and of fatty degeneration. It more frequently occurs in men than in women. The acute form of the disease usually results from exposure to cold and wet, checked perspiration, the excessive use of alcoholic drinks, and especially scarlet fever; and consists essentially of an affection of the gland cells, lining the convoluted uriniferous tubes, induced by their having to eliminate from the blood some matter which is not naturally excreted by the kidneys; or, if natural, is present to a morbid excess. The circulation of unhealthy blood through the kidneys must impair the renal cells, whether the blood be altered by the constant presence of alcohol, or by injurious matters generated within the system, or by the poisons of the eruptive fevers. While the gland cells are undergoing destructive changes, the materials which ought to be eliminated from the system by the kidneys, are more or less retained; their accumulation in the blood increasing its deterioration so that this again aggravates the original mischief, the disease thus becomes fully developed.

The symptoms of acute Bright's disease commence with chilliness, soon followed by feverish

reaction, headache, restlessness, oppression in breathing, nausea, perhaps vomiting, pains in the back and limbs — the symptoms of inflammation — with dropsy, which is first observed as puffiness about the eyes and face in the morning, and frequent urination; but the urine is scanty, heavy, acid in reaction, and very albuminous.

Albumen in the urine is revealed by chemical tests — heat and nitric acid. Heat coagulates the albumen when the urine is acid, and produces a cloud varying in density; alkaline urine must be rendered acid by the addition of a drop or two of nitric acid and heat then applied. Urine containing an excess of earthy phosphates will become cloudy on the application of heat, therefore we employ nitric acid, which dissolves the phosphates, but renders the albuminous deposit permanent. Nitric acid alone will coagulate albuminous urine; but to be sure that it consists of albumen, it is best to test also by heat. It should be remembered that temporary albuminuria may occur in many diseases and yet the patient not have Bright's disease. In Bright's disease the albumen persists, and what are called epithelial tube casts are detected in the urine.

The acute form of Bright's disease proceeds to one of three terminations within a few weeks; viz.: recovery, death, or lapse into the chronic state. Probably about two thirds of the cases recover.

The treatment consists in opening the pores of the skin by means of hot water and hot air baths; keeping the bowels free by purgative medicines: and relieving the kidneys by dry cups over the loins. The diet should be liquid, and simply nutritious. Alcoholic drinks and powerful diuretics should be avoided. After the feverish phenomena have subsided, the quality of the blood may be improved, and the escape of albumen diminished by taking the tincture of chloride of iron. The patient should long avoid sudden changes in temperature, cold, and dampness.

Chronic Bright's disease may be developed so slowly that the sufferer is not aware of his affliction until after the lapse of months or years. There is gradual loss of strength, pallor or puffiness of the face, a frequent desire to urinate, and perhaps shortness of breath, but the occurrence of dropsy often first draws attention to the state of the kidneys. As chronic Bright's disease tends toward a fatal result, those who suspect that they may be afflicted with it, should seek the advice of an honest physician skilled in diagnosing diseases.

Diabetes. Diabetes is a complicated disease characterized by an excessive flow of urine. Two distinct forms of the disease are recognized, viz., diabetes insipidus and diabetes mellitus. The former is also known as diuresis, and is merely a

greatly increased flow of almost colorless urine, containing neither sugar nor albumen. In the latter there is not only a greatly increased flow of urine, but the urine contains a large quantity of sugar, the presence of which is ascertained by chemical tests.

Men are more frequently afflicted with diabetes than women, especially those with a debilitated constitution. The occurrence of the disease is favored by hereditary predisposition, and it generally comes on slowly and imperceptibly without any apparent disorder of the system; it may exist for a long time before it attracts attention. It commences with a feeling of indisposition, excessive urination, slight loss of flesh, parched mouth and intense thirst. The patient has to micturate several times during the night, the skin becomes harsh and dry, there is muscular debility, and the sexual and mental powers fail by degrees. The sufferer becomes gradually more and more exhausted, and the disease often terminates in, or becomes associated with, pulmonary consumption.

Diabetes mellitus generally proves fatal, but frequently is only the indirect cause of death. A diabetic individual, in addition to his liability to consumption, is apt to suffer from boils or carbuncles, or from bronchitis, or from chronic pneumonia, or from gangrene of an extremity.

In the treatment of diabetes, the first and most important point is to regulate the diet, which should be nutritious and as free as possible from saccharine or amylaceous substances.

The sufferer holds his fate in his own hands. If he will exercise self-control, and be satisfied to eat that he may live, instead of eating to please his taste, his life may be prolonged for some years, provided there be no organic disease, and that complications do not arise. Fish, oysters, clams, poultry, and meat of all kinds, excepting liver, may be partaken of freely, with butter, cream, cheese, eggs, and such vegetables as are deficient in sugar and starch, as greens, lettuce, cabbage, cauliflower, spinach, celery, water-cresses, onions and asparagus.

Vegetables which abound in sugar or starch, such as beets, parsnips, carrots, turnips, potatoes, beans, peas, etc., must not be eaten. Rice, sago, tapioca, arrowroot, chestnuts, confectionery, and bread and cakes, made of wheat or rye flour, corn or oatmeal, must also be avoided. The desire for bread may be supplied by the use of gluten bread, bran bread, or almond bread. Tea and coffee without sugar are allowable. Acid fruits may sometimes be moderately indulged in. Beer, cider, sweet wines, and liquors should be avoided; when stimulants are needed by the system, a little brandy and water, or claret, or

Burgundy wine, or dry, sound sherry wine may be used.

Sudden changes in temperature, cold and damp, are especially to be avoided. The body should be protected by suitable clothing, flannel being worn next to the skin. Warm baths, brisk friction, etc., are useful. A long sea voyage in a warm latitude has been found beneficial. Mental relaxation, recreation, and exercise in the open air, are an important part of the regimenal treatment. Among the useful medicines are the alkalies, opium, strychnia, and cod liver oil.

XI.—DISEASES OF THE SKIN.

The skin is liable to many diseases, which vary greatly in their importance and general characters. Some are attended with no danger, others are dangerous to life; some are attended with fever, and are rapid in their course; others are chronic and obstinate; some are contagious, others are not; some destroy beauty, others cause but slight disfigurement, etc., etc.

Skin diseases are modified according as the patient is strumous, anæmic, plethoric, gouty, rheumatic, or dyspeptic; and also by the age and sex, the mode of life, and the residence of the sufferer. It should be remembered that many skin diseases are secondary affections, merely signs of constitutional derangement.

The various diseases of the skin may be divided into eight classes, distinguished from each other by their appearance upon the skin as follows: 1. *Papulæ*, or pimples, little elevations of the cuticle of red color, and not containing any fluid. 2. *Squamæ*, or scales, small, hard, thickened, opaque, whitish patches of unhealthy cuticle. 3. *Exanthemata*, or rashes, superficial red patches,

varying in figure and size, and irregularly diffused over the surface. 4. *Bullæ*, blebs, or miniature blisters. 5. *Pustulæ*, or pustules, circumscribed elevations of the cuticle containing pus, and having red inflamed bases. 6. *Vesiculæ*, or vesicles, small elevations of the cuticle covering a fluid, usually at first clear and colorless, but becoming afterwards opaque and whitish or pearly. 7. *Tubercula*, tubercles, small, hard, superficial tumors. 8. *Maculæ*, spots or patches arising from excess or deficiency of the coloring matter of the skin.

To cure diseases of the skin, both local and constitutional remedies are required; the latter being usually the most important. The object in employing constitutional remedies is (1st) to eliminate from the system the morbid matter upon which the eruption depends, and (2d) to alter the constitutional state which led to the formamation of the poison, and thus restore the healthy tone of the body. The local remedies are of value in assisting the cure of the disease, and also in moderating irritation and pain. Local remedies alone generally give permanent relief in those skin diseases due to the presence of parasite.

XII. — SURGICAL ACCIDENTS AND EMERGENCIES.

Wounds. A division or solution of continuity of the soft tissues produced by violence is called a wound. Wounds may be open or subcutaneous, and are divided according to their nature and causes, into five classes; viz: (1.) Incised wounds, which consist of a simple division of the fibres made by a sharp cutting instrument; (2.) lacerated wounds; in these the edges are torn, usually irregular; (3.) contused wounds, or those in which the edges are bruised; contused wounds are usually also lacerated; (4.) punctured wounds; these are inflicted with the point of a weapon; they are generally narrow and deep, are always painful, and are apt to be followed by much swelling and inflammation; (5.) poisoned wounds, or those which result from snake-bites, the bites of rabid animals, the stings of insects, careless dissecting, etc.

Wounds are dangerous according to their character; i. e., whether incised, or lacerated, or poisoned, or otherwise; the extent of the soft parts which they involve, the parts they occur

in, the age, habits, surroundings and state of health of the patient and the treatment which they receive. The consequences of a wound are pain, hemorrhage, displacement, loss of function and shock. Loss of function may be stiffness, paralysis, deformities, or death.

The first attention generally required by wounds is to wash and gently cleanse the parts which may happen to be covered with dirt, and check the hemorrhage. (See Hemorrhage.) Then the edges of the wound are to be brought together, and retained either by adhesive plaster or a few stitches. Simple incised wounds generally heal quickly without any suppuration taking place, or, as it is said, "by first intention." Should this not be the case, and suppuration come on, poultices and warm dressings should be used to remove inflammation, and afterwards healing ointments applied. Suppuration almost always takes place in lacerated and contused wounds, and the swelling and inflammatory symptoms which commonly attends them, are to be diminished by cooling lotions and emollient poultices. The same general principles apply to punctured wounds. The best advice that can be given in cases of poisoned wounds is to promptly apply for relief to the most skilful physician within reach. (See Hydrophobia.)

Fractures. The fractures to which the bones of

the skeleton are liable, are divided into complete, incomplete, simple, comminuted, compound, and impacted. The main peculiarities of fractures are expressed by these terms. Complete fractures are classified into transverse, oblique, longitudinal, dentate, and comminuted. Incomplete fractures — partial separation of bones — include fissures, infractions, splintering and perforation; the latter being peculiar to gunshot injuries.

The causes of fractures are predisposing and exciting; predisposing causes are an exposed situation, occupations, adult age and disease of the bones; exciting, determining, or immediate causes of fractures are either direct or indirect violence or muscular action.

The symptoms of fracture are pain, swelling, crack felt or heard by patient when fracture occurs, abnormal mobility, displacement, crepitus, loss of function, and injury to neighboring soft parts, as compression of the brain by fracture of the skull. One or more of the above signs may be absent.

The treatment of fractures consists of (1) restoring the fragments to place as completely as possible; (2.) to maintain them in place; and (3.) to prevent or to control inflammation, spasms, and other accidents. Although simple fractures are sometimes very easily cured, it is always best for the injured person to place himself

without delay, in charge of an experienced surgeon.

Dislocations. When the bones which enter into the formation of a joint are displaced as regards their relative position, they are said to be dislocated. (See The Joints, or Articulations.)

Dislocations are usually divided into three classes, viz.: (1.) Accidental or traumatic, when they result from the sudden application of force; (2.) spontaneous or pathological, when they occur from an alteration in a joint as the result of disease; the dislocation of the femur in hip disease is an illustration; (See Coxalgia, or Hip Disease.) (3.) Congenital, when they exist at the moment of birth. When the term "dislocation" is used alone, it is generally understood to mean the accidental variety.

Dislocations are further classified, by surgeons, as complete, or partial; as simple, compound or complicated; as recent, or old; and as primitive, or consecutive.

The symptoms of dislocations are change in the shape of the joint, lengthening or shortening of the limb, pain and inability to move the limb.

The general treatment of dislocations consists in their reduction or pulling the displaced bone back into its place. The sooner this is accomplished the better. As the chief obstacles to reduction are muscular resistance and the anatom-

ical relations of the joint, a correct anatomical knowledge is important; still a person unacquainted with anatomy or surgery may occasionally succeed in reducing a dislocated limb, but there is a vast difference between mere chance and brute force on the one hand, and an intelligent manipulation on the other. An experienced surgeon should always be consulted. In former days, when there was great difficulty in reducing a dislocated limb, bleeding, emetics, and the warm bath were generally made use of to remove the spasm of the muscles; but at the present time chloroform or ether are administered to accomplish the same end.

Asphyxia. As asphyxia may be produced by whatever prevents the access of air to the lungs, the treatment for suspended animation in cases of drowning, strangulation, suffocation, etc., must be essentially the same in principle. The patient should be treated instantly, on the spot, in the open air. Loosen all clothing, especially about the neck and chest. Place the patient gently on his face, with one arm under his forehead, draw the tongue forward, and clear the mouth so that any fluids that may be in the mouth or throat will be removed. Now lose no time, but imitate respiration; turn the patient gently but completely on his side and a little beyond; then on the face again. Repeat these movements fifteen times

in the minute until the patient shows signs of life.

Another method of performing artificial respiration consists in laying the patient on his back, drawing the tongue forward, and raising both arms as far as possible above the head, when inspiration will occur; then bend the elbows, turn the arms downward and press them gently but firmly against the sides of the chest, when expiration takes place. Now stretch the arms at full length above the head again, and thus continue these movements perseveringly fifteen times in the minute until signs of life return.

A little ammonia or other irritants applied to the nostrils at intervals, will aid to excite the nerve-centres. When the patient begins to breathe, commence rubbing the limbs and body vigorously *towards the heart*, to restore the venous circulation; and as consciousness returns, a small quantity of ginger tea or alcoholic stimulants may be given.

Poisons. A poison is any substance which, when absorbed into the blood, is capable of seriously affecting health, or of destroying life. Poisons may be introduced into the body in various forms, and their affects are local and constitutional.

The treatment in all cases of poisoning is (1st) to remove the poison from the system; (2d) to

stop its action, if it cannot be readily and immediately removed; and (3d) to remedy the mischief it has done, and obviate the tendency to death.

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